

Royal Commission
on Canada's Economic Prospects

Skilled and Professional Manpower in Canada, 1945-1965

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ROYAL COMMISSION ON CANADA'S ECONOMIC PROSPECTS

**SKILLED AND PROFESSIONAL MANPOWER
IN CANADA, 1945-1965**

by

Economics and Research Branch,
Department of Labour, Ottawa

JULY, 1957

*While authorizing the publication of
this study, which has been prepared at
their request, the Commissioners do
not necessarily accept responsibility
for all the statements or opinions
that may be found in it.*

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FOREWORD

THE PRESENT report was prepared by the Economics and Research Branch of the Department of Labour, Ottawa, at the request of the Royal Commission on Canada's Economic Prospects.

The report results from the contributions made by a number of members of the Manpower Analysis Division of the Branch. The more significant contributions were made by the following members of the Division: Mr. M. Spalding, who prepared most of the statistical and other material relating to the analysis of past immigration trends and future projections of immigration; Mr. P. Cohen and Mr. J. V. Klein, who, with Mr. Spalding, were largely responsible for the preparation of the statistical material and much of the analysis relating to the formal training of skilled manpower in the past and in the future; Mr. A. M. Sargent, who prepared most of the data on university enrolments and graduations and their projection into the future; Dr. I. Bernolak, who prepared much of the material on labour market trends and shortages in the postwar decade; and Dr. G. Schonning and Mr. F. W. Burton, who were responsible for the preparation of much of the analysis of the future requirements for skilled and professional manpower.

Thanks are also due to the Department of Citizenship and Immigration for their co-operation in supplying special statistical material on immigration to Canada; to the Census Division of the Dominion Bureau of Statistics for assistance in developing statistical information on professional and skilled occupations; and to the Higher Education Division of the Dominion Bureau of Statistics for the preparation of statistical data relating to university enrolments and graduations.

Particular thanks are also due Mr. D. V. LePan of the Royal Commission on Canada's Economic Prospects; Mr. W. E. Duffett of the Dominion Bureau of Statistics; and Dr. G. V. Haythorne of the Department of Labour for their contribution of useful comments and suggestions concerning the report as a whole.

Miss C. B. Archer provided a very helpful editorial service in the preparation of the report, and Mr. J. P. Francis and the undersigned were

largely responsible for the over-all direction of the study and for the development of many of the concepts which underlie it. The undersigned prepared a considerable portion of the first draft of the report, while Mr. Francis has supervised the preparation of the final draft.

W. R. Dymond, Director.

Ottawa, July, 1957.

SUMMARY OF MAJOR FINDINGS

SKILLED AND professional workers of almost every kind are a key factor in Canadian economic growth. Modern industrial development depends more and more on the application of scientific and engineering knowledge to industrial processes and products. While technology frequently reduces or eliminates the need for certain kinds of skilled workers, it also creates a need for new types of skills to plan, to produce, to maintain and in many cases to operate the increasingly complex machines it produces. Such changes also increase requirements for professional and highly technical workers per unit of national output. National defence expenditures, as well as technical advances, create a significant added pressure on scarce supplies of skilled and professional manpower.

No satisfactory general criteria have been developed for classifying occupations according to level of skill or professional competence in terms of work performed. In this report, skilled and professional occupations are defined in terms of the amount of specialized training or experience usually required to become fully competent. An occupation is generally regarded as skilled when two years or more of specialized training or experience are required to reach full competence. Professional occupations are defined as those for which the minimum qualifications are either graduation from a university or college or some generally accepted equivalent combination of special training and experience. It follows from these definitions that supplies cannot be expanded rapidly in the short run, except through immigration.

The total number of skilled and professional workers in Canada, thus defined, has been growing more rapidly than the labour force as a whole. In 1931, skilled workers amounted to approximately 11.0% of the labour force and professional workers to 4.8%, compared with 15.0% and 5.8% respectively, in 1951. (See Table 7.)

Despite this growth in the number of skilled and professional workers, there were many periods during the past decade when available supplies in numerous occupations were not sufficient to match requirements. During the major periods of expansion, 1947-48, 1950-53 and 1955-56, employment increases were sharpest in durable goods manufacturing and construction, industries employing relatively large numbers of skilled tradesmen.

The first period witnessed by far the most severe shortages of skilled workers despite the release of trained men and women from the armed forces and war industries and the additional supplies provided by accelerated wartime training. During the second period of expansion, defence work required elaborate tooling procedures and many short runs of complex military items with the result that unusually heavy demands were created for many skilled workers, especially in the metalworking and electrical trades. Employment expansion in the third period was the sharpest of the postwar decade but few countrywide shortages of skilled tradesmen developed. The explanation lies in the contribution to supplies made by immigration. The net immigration of skilled workers to Canada from 1951 to 1955 amounted to 80,000—10.8% of the number reported in these occupations in the 1951 Census. In this period, the fundamental inadequacy of industrial training resources in Canada, in relation to the high requirements of the economy for additional skilled tradesmen in years of expansion, was obscured by large immigration.

In the years immediately following World War II, shortages developed of many kinds of professional workers. From 1949 to 1952, supplies were more adequate and the situation eased, but since then shortages of professionals have again appeared. The economic and technical advances of the past decade have increased manpower requirements rapidly in engineering and science, business administration, teaching and the health professions.

The contribution of the different sources from which skilled and professional workers are obtained—formal training, net immigration, and on-the-job upgrading—varies considerably from one group of workers and from one period to another. Formal training is a major source of specialized manpower in the case of professional workers and to a lesser extent, highly qualified technical workers. On-the-job experience and upgrading is probably the major source of skilled tradesmen with net immigration claiming an important, although much smaller, role during the past decade. Many skilled tradesmen are the eventual product of formal vocational education at the secondary school level, either in technical institutions or in vocational schools, where a combination of theoretical knowledge and practical experience is given. Such youths are then employed as helpers or learners in their trade and after several years of experience become wholly qualified tradesmen.

Over the decade 1946-56, the number of skilled workers in Canada increased by an estimated 280,000. The total new supply of skilled workers was much larger because those who died, retired or left their trade for other reasons also had to be replaced. The contribution made by net immigration to gross supply, which was considerably more than 280,000, was about 110,000. Limited data on apprenticeship suggest that the contribution from this source was, in all probability, less than half that of

net immigration. Thus on-the-job experience and upgrading, alone or in combination with training in vocational or technical schools, provided more skilled workers during the first 10 postwar years than any other source. Immigration was the second largest source.

Although Canadian apprenticeship training did not contribute large numbers to the postwar supply of skilled workers, it was nevertheless essential because it made a significant contribution of highly qualified tradesmen. The volume of apprenticeship training, moreover, has increased somewhat in recent years. There is evidence that this was due, in part, to a slight increase in the proportion of young people entering apprenticeship training. There has also been a recent increase in enrolments in industrial day classes in vocational and technical schools which, while not providing fully qualified tradesmen, do give useful pre-employment training. The rather modest increase in apprenticeship training and vocational and technical school enrolments since 1951, however, has not matched, by any means, the growth in requirements for skilled workers.

Over the last decade the number of professional workers in Canada increased by about 94,000. The total new supply was much greater because those who died, retired or left professional work for other reasons had to be replaced. During these 10 years, college and university graduations in Canada totalled approximately 134,000. Not all of these graduates, many of whom are women, entered professional occupations. Net immigration during this decade contributed about 16,000 professional workers. It may appear at first glance that the new supplies of professionals from universities and colleges and net immigration should have been more than enough to increase the number of professional workers in Canada by 94,000. There is, however, no indication that professional workers were actually in over-supply during this period. On the contrary, widespread shortages occurred in many professional fields. In many professional occupations, therefore, the new supplies available from graduations and net immigration were not sufficient to meet both requirements arising from the rapid economic expansion of the last decade and the need to replace losses due to deaths, retirements and movements out of the professional field for other reasons. There is evidence, in fact, that in some professions where requirements were growing very rapidly (*e.g.*, engineering) employers augmented supplies by upgrading workers with no university or college training into professional jobs.

The character of Canadian economic growth and the increasing technical complexity of production processes and products resulted in an unusually rapid growth in requirements for workers in the more highly technical occupational fields. The rapidly increasing need for engineers and workers in a range of new technical occupations at the semi-professional level are the best examples of the results of these trends. Since few formal educational

facilities existed for the training of workers in these new semi-professional occupations, Canadian industry partially met such needs by employing engineers to perform these duties as well. This tended to increase further their requirements for engineers.

In the future, as in the past, supplies of skilled and professional workers will depend in large measure on the number of persons of training age in the population. For the last 20 years the population aged 15 to 19, the age span when most persons enter the labour force or begin specialized training, has remained practically unchanged. In contrast, it is estimated that natural population growth alone will produce a very substantial increase in the number of persons 15 to 19 years old over the next 10 years. The supply of professional workers, most of whom are university graduates, is related to a somewhat older age group, those approximately between the ages of 18 and 21. The size of this age group too will increase appreciably in the next 10 years, but its rate of growth will be much faster in the second half of the decade than in the first.

The contribution of formal apprenticeship training to Canada's resources of skilled manpower was estimated to have been about 50,000 over the first 10 postwar years. If about the same proportion of young people enter apprenticeship training during 1956-65 as in the preceding 10 years, the supply of skilled tradesmen produced by apprenticeship may be expected to rise by about 30%, to approximately 65,000 for the decade. During recent years the proportion of young people entering apprenticeship has risen. If the rate remains as high during the next decade as it was in 1956, the supply of skilled workers produced by apprenticeship training from 1956 to 1965 would be about 75,000. The total may be higher than this if the increase in participation rates has not yet run its course. Such an increase in apprenticeship training would, of course, be contingent upon the expansion of workshop and classroom facilities for such training.

University and college graduations will continue to be the main source of professional workers. If the proportion of the college-age population attending university continues to increase at about the same rate as it has since World War II, graduations may be expected to total 67,300 in the five years from 1955-60 and 93,100 from 1961-65. In the two halves of the postwar decade graduations numbered 68,000 and 67,000, respectively.

The many uncertainties about the prospective volume of immigration and emigration do not preclude the forming of some expectations that, barring a major war or a drastic economic reversal, appear to be reasonable. An analysis of past trends, and of the manpower situation in the countries from which most immigrants to Canada come, suggests that the outlook for net immigration during 1956-65 is somewhat different for skilled workers than for professional workers. The projected annual net immigration of

skilled workers for this period, excluding the unusual years of 1956 and 1957, is a good deal lower than the actual average for 1951-55. On the other hand, the projection for professional workers is only slightly below the 1951-55 rate, even though a decline in total net immigration is projected. It has been assumed that the proportion of professional workers among immigrants will remain at the higher levels of recent years and that the ethnic groups that contribute large numbers of professionals will play a relatively more important role in future immigration.

On the basis of the projections made, new supplies of professionals from university and college graduations and net immigration for the years 1956-60 will be only slightly higher than the actual total of 85,000 for the preceding five-year period. During 1951-55, however, graduations were declining, while over the next five years they will be increasing moderately. After 1960, the increase in the college-age population combined with anticipated growth in the proportion of this group attending university will have a dramatic effect. From 1960-65, despite a projected drop in net immigration of professionals, total new supplies may reach approximately 110,000, an increase of nearly 18,000 over the preceding five years.

During the next decade, requirements will probably be more intense for engineers than for most other professional groups. New supplies of engineers will also increase from 1956 to 1965. If it is assumed that by 1965 engineering enrolments will have increased from the present 15% to 17% of total undergraduate enrolment, graduations alone may be expected to provide about 10,000 engineers during 1956-60 and 15,000 during 1961-65, compared to 8,000 during 1951-55. Net immigration, on the other hand, will probably play a diminishing role as a source of engineers. The projections in this report suggest that the contribution of net immigration to the supply of engineers will be lower in 1961-65 than it will be in 1956-60. This drop, however, will be more than offset by the prospective increase in graduations.

Future requirements for skilled and professional workers will be the product of changes in the total population and employment as well as in the relative importance of a myriad of other factors that cause an occupation to grow more or less rapidly. The general role of these other factors, many of which are qualitative in nature, is not necessarily the same for skilled workers as for professionals. For example, while requirements for both groups are affected by such major developments as the rising standard of living and increasing substitution of capital for labour through technological change, the demand for professional workers is being increased more by these developments than is that for skilled tradesmen. As a first step, however, projections of requirements, as measured by the number of workers in the labour force, can be made on the basis of past trends.

One projection of future requirements for skilled workers discussed in this report is based on the assumption that the proportion of these workers

in the labour force will continue to expand during the 1956-65 decade but only at about one-quarter the rate of the preceding 10 years. A projection on this basis would mean that by 1965 skilled workers would constitute 17.2% of the labour force, compared with 15.0% and 12.3% in 1951 and 1941 respectively. On the basis of this projection, the total number of skilled workers in 1965 would be almost 300,000 greater than in 1955. The main reason for assuming that requirements for skilled workers will increase more slowly in the second than in the first postwar decade is that the importance of such industries as manufacturing, mining and construction, where skilled workers are concentrated, is unlikely to increase as rapidly in the next 10 years as it has in the past. Another reason is that with the extension of automatic processes in industry, some of the functions of skilled tradesmen either will no longer be required or will be performed by technicians. If requirements for professional workers, measured in a similar way, were to grow at the same rate as they did during the period 1931-51, professionals would comprise 6.7% of the labour force by 1965, compared to 5.8% in 1951 and 4.8% in 1931. On the basis of this projection, the total number of professional workers in 1965 would be approximately 130,000 greater than in 1955.

Changes in the standard of living and the impact of scientific and technological advance on industrial development are two factors that will have a widespread influence on future requirements for skilled and professional workers. As real income per capita increases, a smaller percentage of income is likely to be spent on such basic necessities as food, clothing and housing, while a greater proportion may be spent on such commodities, formerly considered luxuries, as automobiles, television sets and many other consumer durable goods. More direct effects, particularly on requirements for professional workers, are likely to appear as a result of the allocation of a larger percentage of income to satisfying demands for special services in such fields as education, health, culture and recreation. The application of new scientific and technological discoveries is bringing about changes in industry on a wider front than ever before. The needs of defence and the importance of keeping technically ahead of potential enemies have played an important part in launching the current wave of technical advances. Automation has been accelerated largely by a rapid growth of demand, limited supplies of labour and new applications of science to industry. Current indications are that during the next decade the rise in the standard of living and technological advances will continue to be important factors and may even have greater effects than in the past.

The future impact of these two factors on requirements for skilled and professional workers will not be the same. The demand for skilled workers will continue to be strong, but a much more drastic change is probably taking place in the composition of this group than in that of the professional group and this trend is likely to continue in future. A rising standard of

living will undoubtedly result in the appearance of new products and new industries and hence in a growing demand for skilled workers. On the other hand, the trend toward automatic processes is likely to slow up the growth in requirements for certain types of skilled tradesmen while at the same time increasing the requirements for newer kinds of technicians. In respect to professional workers, the effects of these factors will probably raise requirements above estimates derived from historical trends. A rising standard of living will tend to broaden the demand for many kinds of professional workers and advances in technology will speed up the need for such specialists as scientists and engineers. While the number of professional workers can obviously not continue to increase indefinitely, it is not likely that any levelling off will occur until after 1965. Comparing this outlook for requirements of professional workers with probable supplies, it appears likely that shortages of varying degrees will continue in many fields until about 1960, apart from the effects of any temporary slackening in economic expansion during these years. After that time, however, growing requirements and new supplies may come more closely into balance.

These findings provide a factual background against which measures for improving the quantity and quality of Canada's resources of skilled, technical and professional manpower can be considered and policy recommendations formulated by educational authorities, private employers and other agencies concerned with the training, education and utilization of such workers. Despite the scarcity of comprehensive factual information on resources and utilization of specialized manpower, an effort has been made to mobilize existing data and to present them in a systematic fashion. Much remains to be done in developing comprehensive and current information on a uniform basis on many aspects of the training and utilization of skilled and professional workers.

It is important to note a few of the implications for the training and utilization of specialized manpower of a rapid rate of economic expansion such as has occurred in Canada and is likely to continue. When requirements for specialized manpower increase rapidly, needs are often met on a makeshift basis. Training facilities become overcrowded, unusually large use is made of upgrading and on-the-job experience as a means of acquiring skills, many training programmes for skilled and technical workers are accelerated, underqualified instructors are pressed into service and a very heavy reliance is placed on immigration. There is evidence that many of these were features of the Canadian situation during the past 10 years.

During the postwar decade, as in earlier years of rapid economic expansion, the long-run insufficiency of Canada's vocational and technical and higher educational facilities was obscured by the easily available supply of immigrants possessing excellent qualifications. This immigration, valuable and essential as it has been to the rapid development of Canada, has tended

to reduce the urgency of giving consideration to the longer-run adequacy of our education and training institutions. During the next decade, requirements are likely to outrun supplies of trained and qualified workers in many skilled and professional occupations. If these demands are to be met, training and educational facilities of all kinds will have to be expanded in an orderly fashion. This will involve the careful planning and creation of suitable curricula, the acquisition of competent staff, the careful analysis of skilled and professional manpower, and continued studies of the best types of training and educational programmes in the light of requirements. Even apart from increasing requirements, the known expansion in the number of young people reaching the age at which specialized training can be undertaken will mean that training of some sort will have to be provided.

The heavy reliance placed in the past on informal on-the-job training and upgrading as a means of acquiring competence has both advantages and limitations. It has created a labour force more adapted to changing occupational requirements than when a large portion of workers are highly qualified specialists produced after long years of training. At the same time, it points up the desirability of a greater degree of formal institutional education and training in the future, particularly if less reliance is to be placed on the immigration of more highly trained manpower from abroad. Fast-changing technical developments affecting skilled and technical occupations create a need for people with a thorough grounding in basic mathematics and science, which in turn means longer periods of formal training.

The continuing growth in requirements for professional workers, combined with the probably diminishing role of net immigration as a source of new supply, and the increase in the college-age population and the proportion going to university, means that relatively more professional workers will have to be trained in Canada in the future than in the past. One factor of significance here, particularly in such fields as engineering and science, is the relation between the employment of professionally qualified personnel and the variety of technicians who assist them. Developments of the past few years have shown that greater availability of qualified technicians would help to ease shortages of professionals because many of the latter are performing functions that could more satisfactorily be undertaken by qualified technicians. An increase in training facilities for technicians, therefore, would help to relieve shortages of professionals.

INTRODUCTION

Significance of Skilled and Professional Manpower

The quality and quantity of a country's resources of skilled and professional manpower are crucial to its economic development. Nevertheless, it is often assumed, except in periods of wartime emergency, that manpower supplies of the requisite quantity and quality will be forthcoming with little conscious planning or attention.

In the literature of economic development, the main contributing factors to economic progress usually include savings and capital formation, the organization of the market, legal and political institutions, entrepreneurial mentality and behaviour, the level of scientific and technical knowledge, income distribution, physical resources and general population growth. The subtler aspects of labour supply are largely neglected as a factor contributing to economic development and exclusive emphasis is usually placed on a quantitative and demographic approach to manpower resources.

The growth of modern industry is accompanied by an ever-increasing specialization of labour and diversification of occupations. The view that economic advance implies mass production, which in turn implies the substitution of semi-skilled and unskilled labour for skilled craftsmen, has been largely discredited in recent years. Economic development involves increasing mechanization and diversification of production and depends more and more on the application of scientific and engineering knowledge to industrial processes and products. New processes and products often give rise to new occupations which frequently require higher levels of training and skill than did the processes and products they supplant. While advancing technology frequently reduces or eliminates the need for certain kinds of skilled workers, it also creates a need for new types of skills to plan, to produce, to maintain and, in many cases, to operate the increasingly complex machines it produces.

While scientific and technological advances are continually being made and while fully automatic systems for producing and distributing goods are coming into existence, even the most optimistic of those who speculate on the implications of so-called automation do not expect the advent of wholly self-directing and self-timing machines to dispense with the need for skilled workers and technicians in considerable numbers in the foreseeable future. The National Manpower Council in its study *A Policy for Skilled Manpower* has pointed out that: "From today's vantage point, the automatic factory of the future promises to displace the semi-skilled operative—the machine tender whose work is narrowly specialized and more or less routine—in much the same way that earlier changes in technology adversely affected the handicraftsman, and to give added significance to the skilled and technical labour needed for production, maintenance and repair of the new automatic machinery."¹

The demand for highly skilled harness makers, for example, who were displaced by the mass production automobile industry with its large numbers of semi-skilled workers, has been replaced by growing requirements for skilled automobile mechanics, specialists in highway construction and maintenance, a variety of mechanical engineers, electronic specialists, design engineers and a vast variety of other engineering talents, to say nothing of the increased need for many skilled tradesmen and technicians who install and operate the complex machinery of the automobile industry and who repair and maintain the vehicles themselves.

Over the past 50 years, Canada has evolved from a predominantly agricultural country to one based on the exploitation of a variety of such primary raw materials as forest products, metals and fuel resources, as well as on the development of secondary manufacturing and tertiary service industries. These economic changes point to increasing requirements for professional and technical workers per unit of national output. The pace of technological change has accelerated in the Canadian economy in postwar years and this too has had a significant bearing on requirements for skilled and professional workers.

To a growing extent, the progress of industry depends on the application of scientific advances to new products and production methods. This in turn involves an increasing use of scientists, engineers, technicians and skilled tradesmen. In 1901, for example, Canada had fewer than three engineers for every 1,000 non-farm workers, whereas today it has more than eight per 1,000. Canadian census statistics also show that in the 20 years from 1931 to 1951, skilled workers increased from 11% of the labour force to 15%.²

¹National Manpower Council, *A Policy for Skilled Manpower*, Columbia University Press, New York, 1955, p. 57.

²cf. Table 7.

Scientists are involved in the creation of ideas that may later be applied to products and processes. These may result in a new mechanical discovery, a new physical principle, a future understanding of the behaviour of matter or the imaginative application of new materials or structural forms to known needs. The implementation of new ideas by engineers and supporting technicians follows this initial creative effort. At this stage, new ideas are selected and applied to known technology or new technologies are invented. This involves the vast arrangement of design materials, structures, pilot plant testing, tool design, layout and operational standards. The third stage requires the organization of the human, financial and technological factors for efficient production. Here management specialists, industrial engineers and a host of specialists concerned with planning and distribution are needed, as well as technicians and skilled tradesmen to maintain and operate the new machinery used in the production of new products. An expanding technology, therefore, places pressures on engineers and scientists at the creative end and on technicians and skilled tradesmen at the production end.³

Since 1950, national defence expenditures have played an important role in the Canadian economy. When translated into manpower terms, these expenditures have created a significant additional pressure on the scarce supplies of skilled and professional manpower. The complex weapons upon which our national security depends have to be designed, maintained and operated. Behind modern weapons, modern military organization and the requirements of global strategy, lie research and the production of integrated offensive and defensive weapons for use on land, sea and air. Large numbers of scientists, engineers and other highly trained workers are required by the Defence Research Board, the National Research Council, defence industries and the universities, all of which make important contributions to national security. In addition to the increased demand on the design and production side, scientists and engineers are also being used to an increasing extent on the operational side of the armed forces for maintaining and operating complex military weapons. The pressure is particularly acute in the Air Force, which requires large numbers of skilled tradesmen and technicians to keep aircraft airborne.

It is no exaggeration to say that, as much as on anything else, national defence depends on maintaining technological supremacy in the science of warfare, which in turn depends on the quantity and quality of a bewildering variety of engineers and scientists. This point was made very strikingly by Dr. O. M. Solandt, former chairman of the Defence Research Board, when he said:

“The present relative stability of the world depends upon a balance of defensive and offensive capabilities between East and

³Partially based on J. Douglas Brown's "Shortage of Creative Manpower", *Monthly Labour Review*, Dept. of Labor, Washington, May 1954, pp. 507-508.

West. This balance in turn depends upon the productivity of scientists and engineers in the two halves of the world . . . Since [1950] it has been increasingly obvious that, at least in certain selected lines of development, the Russians were actually overtaking the West. Recent attempts to find the explanation for this phenomenon suggest that it lies in the field of education . . . Because of this the output of scientists and engineers in the U.S.S.R. has overtaken and passed that of the U.S. and may soon exceed that of major nations of the free world combined. The best evidence we have suggests that this increase in numbers has been achieved without any sacrifice in quality."⁴

While skilled and professional workers are clearly a basic requirement for economic development, it should not be assumed that overly generous supplies of specialized manpower will necessarily lead to a greater pace of development. A good deal of the growth in productivity of North American industry stems from the high degree of application of power and machinery to production, and this in part has been the result of manpower shortages, which made labour a relatively expensive factor in production. Thus, overall labour shortages in North America have played a role in the consequent widespread introduction of labour-saving and labour-displacing machines and techniques. In commenting on this point, the National Manpower Council study stated: "The relative scarcity of labour, particularly of skilled labour, and an entrepreneurial mentality that was not dismayed by innovation and risk stimulated improvements in technology at a rapid rate."⁵

An important aspect of the use of skilled and professional manpower in the production process is that supplies cannot be expanded rapidly in the short run, as usually can be done for unskilled and semi-skilled labour. Most skilled tradesmen require at least two years of training and/or experience; professional workers require from four to five years. The productive potential of the economy, therefore, is largely limited in the short run by the supplies of skilled and professional manpower immediately available.⁶

Furthermore, even in periods of rapid technological change, training institutions respond very slowly to demands for new kinds of specialists requiring new types of knowledge and this limits still more the capacity of the economy to adjust rapidly to new technological developments. Evidence of this limitation was very pronounced in the postwar decade, when the demand for new kinds of engineering technicians was so much greater than available supplies.

⁴Extract from an address given by Dr. O. M. Solandt to the Canadian Industrial Preparedness Association, Oct. 27, 1955.

⁵National Manpower Council, *op. cit.*, p. 39.

⁶Evidence of this is found in a survey conducted by the Dept. of Labour of employers of professionals (see pp. 33-34).

Definitions of Specialized Manpower

The subdivision of occupations is a process akin to that of natural growth in which living cells are continually subdividing. For example, the automobile industry creates a need for experts in traffic control and air transport creates requirements for long-range weather forecasters. Specialization of economic functions and consequently of skills, a word that in the past meant a distinction, is found in all organized societies no matter how primitive. The continually increasing specialization of occupations has been one of the distinguishing aspects of economic development since the first industrial revolution.

In the mediaeval world there were only a few handicraft skills. The relatively small number of craft guilds indicated the limited extent of specialization. Three gradations of craftsmen were distinguished by the guild: apprentice, journeyman and master.

The industrial revolution was accompanied by an accelerated division of labour and a growing specialization of occupations. The growth of scientific knowledge and technology and the newly created factory system led to the development of many new occupations, and to the grouping of labour into such categories as skilled, semi-skilled and unskilled.

In the so-called professional field, too, the range of specializations has increased greatly. At the end of the 17th century, only three professional categories were recognized: divinity, law and medicine. Today the Canadian census lists 37 classes of professional occupations, not including the professional specialties in engineering and in the social and physical sciences. The growth of professional specialization has been hastened, of course, not only by the growth of the economy, but also by the increasing complexity of the social and political structure.

Problems of Occupational Classification

The classification of occupations depends largely on the type of operation or work performed, the character of the training required for efficient performance, the type of product on which work is done and the social status accorded the occupation. The requirement of university graduation and the existence of a professional organization, for example, are often accepted as evidence that a given occupation has attained professional status.

The classification of occupations according to level of skill is a difficult and often contentious task. The general rule is simple, namely: the greater the preparation and training, the more skilled the occupation. However, custom and established practice often determine the length of training required so that this criterion is not a safe guide to the degree of skill. The occupational hierarchy may be viewed as a spectrum in which the unskilled,

semi-skilled and skilled represent arbitrary divisions about which there may be a good deal of doubt.

The name applied to an occupation may affect its social prestige and vice versa. "White-collar" occupations are more highly regarded than manual occupations, for example. The word technician implies more social prestige than tradesman or mechanic. Sometimes the degree of skill attaching to an occupation is relative or at any rate not clearly defined and society's views of what denotes skilled or unskilled work change in the light of changing technology, changing economic organization and changing educational developments.

Skilled Tradesmen

The length of training usually required to become proficient provides some basis for distinguishing skilled workers from others. The training period, whether formal or informal, is fairly lengthy for skilled workers, for the purpose of the training is to equip these tradesmen with a distinctive complex of abilities essential for specialized work performance.

The relatively small number of skilled tradesmen, the training and/or experience that they possess and the strategic position they hold in the production process place them on a higher level in the occupational hierarchy with regard to both earnings and prestige. Because of the lengthy training and/or experience required, however, the numbers of skilled workers, as of professionals, cannot be increased over short periods of time, and skilled workers cannot be replaced by less skilled workers without major changes in technology and work functions; in many cases they cannot be replaced even with these changes.

Skilled workers may acquire their skill in one or more of three ways: through formal instruction; through more or less informal training; by work experience. No one method is necessarily more valid than another as a means of determining whether a particular occupation is skilled or not. Some minimum period of training or distinctive work experience, however, varying with the occupation, is necessary. Even with very intensive training, most skills are not usually developed in much less time than two years.⁷ The Canadian Department of Labour, in developing criteria for identifying critical skilled occupations for purposes of emergency allocation of the work force, designated two years as the minimum training time required. Most apprenticeship programmes for skilled tradesmen last four years or longer.

The requirement of a minimum training period of two years, or equivalent specialized experience, excludes from the skilled category occupations

⁷National Manpower Council, *op. cit.* p. 49.

that require such skills of a general nature as the ability to read or write or to use simple mathematics, and occupations whose skills can be developed in a short time. A list of the skilled occupations from the Canadian census used for purposes of statistical analysis in this report is contained in Table 5.

Technicians

Difficult as it is to define skilled tradesmen, it is still more difficult to define technicians. The word is being increasingly applied to specialized occupations as technology develops and becomes more complicated. In some cases, the term is applied to old occupations to give them greater social prestige; in others it is coined for traditional occupations in which formal training methods are being used to an increasing degree.

Technicians are often described as semi- or sub-professional workers. For many of them, formal education after secondary school graduation is the desired form of training. The National Manpower Council report points out:

"Most technicians perform tasks which either were at one time or still may continue to be, within the range of the functions of professional personnel. Many of them work in a direct, supporting capacity to professional persons and scientists. The qualities peculiar to technicians are said to rest upon a combination or blend of two elements: some of the theoretical knowledge associated with a profession, and skills which are manual or involve the use of instruments. Many experts separate technical workers from the skilled group and locate the technician midway 'between the skilled person and the professional person in the developmental structure of American jobs, in his work performance, and in his educational attainment'."⁸

The term technician instead of skilled tradesman does not necessarily denote significant differences in the nature of the skills possessed but may indicate the influence of institutional factors. The growing practice of designating certain groups of workers as technicians, or with a qualifying adjective (as engineering technicians or electronics technicians) is part of the trend toward a preference for mental rather than manual work. While formal instruction is heavily relied on to train technicians in the newer specialties, many also develop their skills through work experience and informal training. Canadian Census classifications have not yet followed the trend toward the newer terminology of technicians so that relatively little statistical information is available on these workers as yet.

⁸*Ibid.*, p. 51.

Professional Workers

The number of professional occupations, like that of skilled and technical ones, has tended to proliferate rapidly in the past 50 years. This development stems partly from the higher social status accorded to professional work and to occupations that require relatively long periods of formal education following secondary school graduation.

Because of the absence of generally accepted criteria, it is difficult to determine which occupations and which persons within a given field of work are at the professional level. This difficulty varies from field to field, for some professional occupations have a long history and are thus accepted as such, while others are relatively new and are struggling for recognition. The problem is further complicated by the fact that many persons with specific professional training assume other occupational roles. A mechanical engineer, for example, may be a college president or professor; an economist may be a government or business administrator; a chemist may become the controller of a chemical company.

A further difficulty is that, within any given professional field, there tends to be a continuum from the person with graduate or professional training and several years of experience through those with less formally acquired training to persons who have acquired professional status entirely through work experience. For example, the Department of Labour's Technical Personnel Register shows that 10% of the mechanical engineers registered never attended university and 2% attended but did not obtain a degree. At the other end of the continuum, 6% had either a master's or doctor's degree. The rest had bachelor's degrees alone.⁹

Some university courses are highly specialized and lead directly to the practice of the professional occupation in question; others are more general in nature and result in university graduates entering a variety of less specialized occupations. When an occupation has a number of university graduates in it, it tends to be publicly accepted as a professional occupation by virtue of this fact alone and regardless of any other criteria that might be applied.

Another complication arises from the great variation in the duties, responsibilities, experience and formal training of workers in many professional fields. Some workers in these fields are considered to be at a professional level while others are not. The criteria applied in judging whether performance is at a professional level or not varies from field to field and makes even more difficult the determination of the number of professionals in a field.

These comments suggest that there is no simple way of determining whether or not an occupation or an individual within an occupation is a pro-

⁹Dept. of Labour, *Technical Personnel Quarterly Bulletin*, Ottawa, April, 1953.

fessional. In practice, however, several criteria are commonly used for this purpose. The most important is the requirement of extensive formal education usually obtained in a college, university or professional school. As indicated above, most workers in a given profession possess this qualification or its equivalent in work experience.

A further hallmark is that the performance of most work in the occupation requires a considerable degree of systematic or theoretical knowledge, the acquisition of which is generally considered to require above-average intelligence.

The *Dictionary of Occupational Titles* of the United States defines professional occupations as those which “predominantly require a high degree of mental activity by the worker and are concerned with theoretical or practical aspects of complex fields of human endeavour. Such occupations require for the proper performance of the work either extensive and comprehensive academic study, or experience of such scope and character as to provide an equivalent background or a combination of such education and experience”.

A list of the professional occupations from the Canadian Census used for purposes of statistical analysis in this report is contained in Table 6.

EMPLOYMENT TRENDS AND LABOUR SHORTAGES

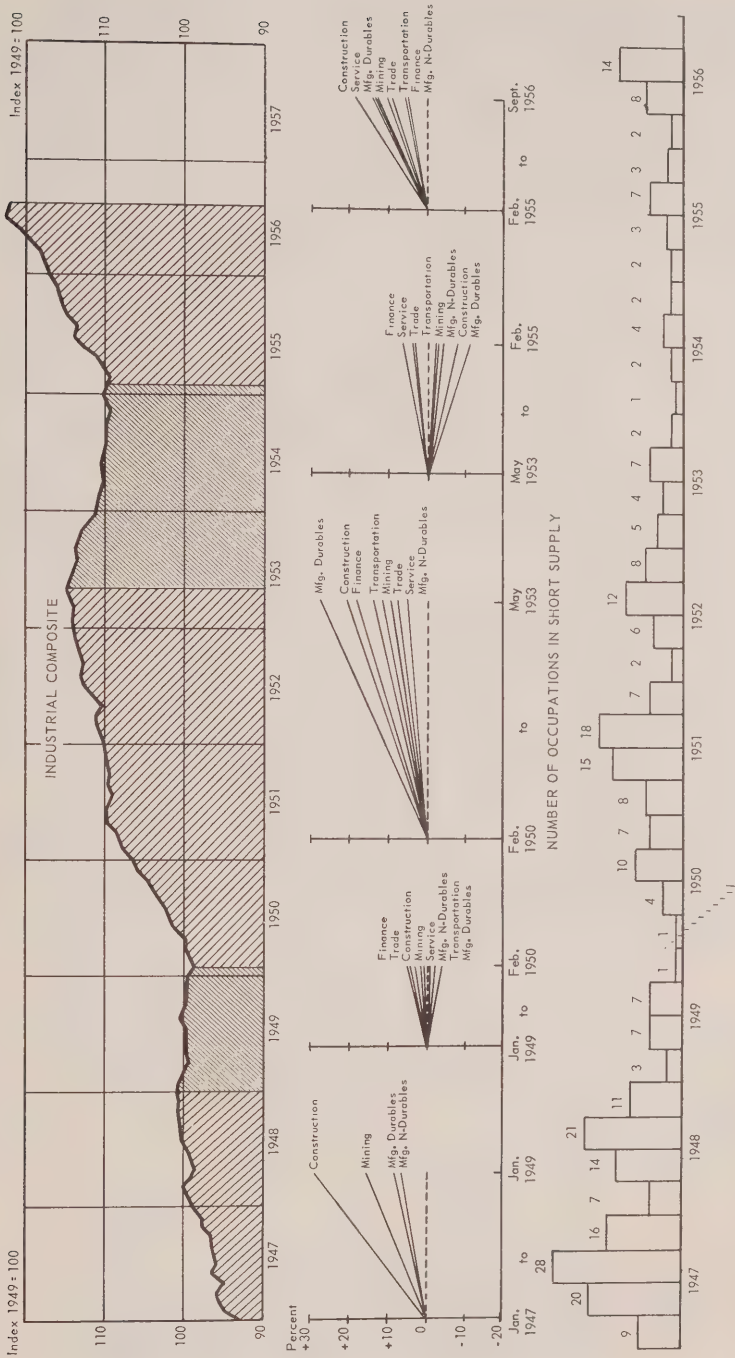
THIS CHAPTER examines the relationship between economic and employment developments over the postwar period and assesses the intensity and extent of labour shortages which occurred during these years. It also evaluates the extent to which unique circumstances on either the supply or requirement side were operative in ways which cannot normally be expected to recur in future years. It is hoped that this assessment, in conjunction with the analysis of trends in new supplies of skilled and professional workers, will provide an historical setting against which future trends may be discussed.

The decade 1947-56, as Chart I indicates, has been characterized by waves of expansion of business activity and employment followed by periods of stability or slackness. Extensive countrywide manpower shortages in many occupations—particularly of skilled and professional workers—have been characteristic of the years of expansion in almost every case.

Chart II represents an assessment of the extent of shortages for selected occupational groups in Canada over the years 1947 to 1956. This chart is based on a comparison of the number of persons registered for work at all National Employment Service offices across Canada with vacancies listed by employers. The comparison is made once each quarter for each year. Each • represents a situation where vacancies listed in the occupational group amount to 50% or more of the number of persons registered. Where there is no •, the ratio of vacancies to registrations is less than 50%.

If these statistics represented a completely accurate measure of demand and supply, and if imperfections in the operation of the labour market were completely absent, a shortage situation would not be apparent until the ratio rose above 100%. Only then would there be more jobs available for workers in an occupation than there were persons seeking such employment.

Chart 1
INDUSTRIAL EMPLOYMENT TRENDS AND OCCUPATIONS IN SHORT SUPPLY, 1947 - 1956
(Seasonally Adjusted)



Source: Employment and Payrolls, D.B.S. and U.I.C. forms 757.
Adjusted for seasonality and strikes, Economics and Research Branch, Department of Labour.

Chart II
LABOUR SHORTAGES FOR SELECTED OCCUPATIONAL GROUPS, CANADA, 1947 - 1956

Note: Each (•) represents a situation in which vacancies listed by employers amount to fifty percent or more of the number of applicants registered at National Employment Services Offices

SELECTED OCCUPATIONAL GROUPS	1947			1948			1949			1950			1951			1952			1953			1954			1955			1956										
	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.							
Doughmen																																						
Engineers																																						
Farm and Harvest Hands																																						
Food and Tobacco Products																																						
Primary Textiles																																						
Secondary Textiles																																						
Loggers and Bushmen																																						
Cabinet Makers and Woodworkers																																						
Boot and Shoe Workers																																						
Machinists, Toolmakers, Diesellers																																						
Other Machine Shop Workers																																						
Sheet Metal Workers																																						
Foundry Workers																																						
Boilermakers																																						
Structural Iron and Steel																																						
Welders and Flame Cutters																																						
Blacksmiths, Farriers, etc.																																						
Fire Dressers and Smelters																																						
Electricians																																						
Electrical Machinery etc.																																						
Electrical Equipment N.E.C.																																						
Manufacturing, Transportation Equipment N.E.C.																																						
Aircraft Workers																																						
Miners																																						
Bricklayers and Tile Setters																																						
Carpenters																																						
Cement and Concrete Finishers																																						
Plumbers and Steam Fitters																																						
Stationary Engineers and Firemen																																						
Coinmen and Shovelmen																																						
Blasters, Powdermen and Drillers																																						
Millwrights																																						
Auto Mechanics																																						
Number of Occupational Groups with Labour Shortages	9	20	28	16	7	14	21	11	3	7	7	1	1	4	10	7	8	15	18	7	2	6	12	8	5	4	7	2	1	2	4	2	3	7	3	2	8	14

Source: Compiled by Economics and Research Branch, Department of Labour from U.I.C. Forms 757

In practice, however, a number of factors are operative which suggest that shortages occur when this ratio is well below 100%. The most important of these is that workers generally have a strong incentive to register with the National Employment Service when they are not working because such registration is a legal requirement for unemployment insurance benefits. Employers, on the other hand, have no such incentive stimulating them to list their vacant jobs and tend to do so to a greater extent when workers are not readily available to them in other ways. Thus, the statistics on registrations are, on the whole, a more complete measure of labour supply than are vacancies of labour requirements.

A further significant factor is that the occupations designated on the chart represent groupings of related occupations and are also Canada-wide totals for about 200 different National Employment Service offices. This means that every worker in the total count of registrations cannot be matched with every vacancy because their qualifications may not match the requirements of the job vacancies and because the geographic mobility of workers between offices in widely differing areas of Canada is limited. There are still other factors which prohibit the complete matching of workers with job vacancies, but the above are the most important.

The effect of these limitations on the statistics means that some shortages of workers generally occur in individual occupations and in many areas of Canada long before the ratio approaches 100%. In effect, this has been found to mean that when the ratio exceeds 50%, many of the occupations in the occupational group as a whole are in short supply in a great many areas across Canada.

Because the factors affecting the labour market for skilled tradesmen are considerably different from those having an impact on professional workers, these two groups of specialized manpower will be examined separately in this chapter.

Skilled Tradesmen

As Chart I indicates, there were distinct periods of employment expansion or recession over the past decade. Chart II reveals that the pattern of labour shortages also varied considerably over the decade, being very widespread in 1947 and 1948, in 1951 and 1952, and to a considerably lesser extent in 1956. Due to these changing patterns, the following analysis will be related to the periods indicated in Chart I.

Immediate Postwar Expansion, 1947-48

The years 1947-48 were years of recovery from the aftermath of World War II when requirements for skilled workers in many sectors of the economy were exceptionally strong.

Investment expenditures for new construction, industrial plant and equipment, public utility projects and residential housing expanded rapidly, and reached unprecedentedly high levels in 1947-49. Employment in the construction industry increased by almost 40% between 1946 and 1948. These developments were reflected in widespread shortages in most of the skilled construction trades during almost every quarter of the two years, even in February when the construction industry is usually slack.

Personal expenditures on consumer goods and services rose at a rapid rate during the postwar transition period, reflecting a large backlog of deferred demand and high levels of accumulated personal savings.

The increases in expenditure resulted in substantial increases also in industrial production and employment. During the two-year period beginning with the fourth quarter of 1946, total employment increased by 2%; the increase in non-farm employment was almost 6%. During the same period, the labour force increased by less than 2%. As a result, practically full employment conditions existed in both 1947 and 1948 and the number of persons seeking work averaged as low as 2% of the labour force.

In manufacturing, the employment increases were proportionately much greater in durable goods industries than in non-durables, and were most heavily concentrated in electrical apparatus and supplies, wood products and iron and steel products. Among non-durables, textiles and clothing registered above-average employment gains.

These developments placed heavy pressure on the relatively limited supplies of skilled tradesmen available and led to continuing shortages during most of the period in a number of occupations. Tradesmen in greatest demand were primary and secondary textile workers, cabinet and wood workers, sheet metal workers, foundry workers, electrical machinery tradesmen and auto mechanics. Expansion of the forestry and mining industries in these years also led to continuing shortages of loggers and bushmen, skilled metal mining workers and heavy labourers for the mines.

Of the selected occupational groups listed in Chart II, four were in continuous widespread shortage throughout the eight quarters of 1947-48 and another 13 were in continuous shortage for from three to seven consecutive quarters. In the following two years, 1949-50, only plasterers and draughtsmen were in widespread shortage for more than two consecutive quarters. Shortages became acute once more during the three years of the Korean defence buildup (1951-53) and 11 occupational groups were in shortage for three or more consecutive quarters during the period.

The years immediately following World War II, therefore, witnessed by far the most severe shortages of skilled tradesmen in the postwar decade.

On the requirement side, these were years of exceedingly heavy demand for skilled workers, particularly in the durable goods industries and in construction where relatively large numbers of these workers are employed. While the possibility should by no means be ruled out, it is unlikely that in future such a heavy demand for skilled tradesmen will develop in these sectors of the economy where, over the two-year period, there was a rapid buildup of employment from relatively low levels.

On the supply side, the usual sources of new skilled workers brought a relatively limited number of workers into the labour force. Several factors, however, affected the supply of skilled tradesmen during this period. The reconversion of many industries from wartime to peacetime production released numbers of skilled workers. In addition, accelerated wartime training programmes and a four-year period of full employment had helped many workers acquire relatively high levels of skill. Similarly, the demobilization of the armed forces provided the economy with additional supplies of skilled tradesmen, who either were already skilled when they enlisted or had acquired their skills in the forces. The rapid transition to high levels of peacetime production was facilitated somewhat by supplies of skilled workers from these sources.

New supplies of skilled workers, however, were relatively limited, particularly from immigration, when compared with some of the later years in the postwar decade. Chapter 3 outlines the role of apprenticeship and immigration as primary sources of additional skilled workers. As the chapter shows, however, the number of skilled tradesmen drawn from these two sources alone was clearly insufficient to meet the rapidly expanding requirements for such workers during the two-year period, 1947-48.

To obtain the labour they needed so urgently, some employers were forced to lower the qualifications required of job applicants, but most were doing this only as a last resort. In some cases, it was possible to introduce new machines that enabled employers to use workers at lower levels of skill.

The experience of 1947-48 suggests that intensive and widespread shortages of skilled tradesmen will appear in the Canadian economy in periods when the durable goods and construction industries are expanding at high rates unless large numbers of skilled tradesmen are available from domestic training programmes or immigration.

Pre-Korean Stability, 1949

The incidence of countrywide labour shortages dropped sharply in 1949. Only one of the occupational groups (plasterers) shown in Chart II recorded shortages throughout the year and only four additional groups recorded shortages for two consecutive quarters. Shortages were reported

in a total of seven occupational groups during the peak employment season in August.

The economy remained stable at high levels during the year. National expenditure rose slightly but the increase was not shared by all sectors. The most substantial increases occurred in personal spending on durable goods and new residential construction. Industrial production remained high but the increase from 1948 to 1949 was less than 2%. Total employment continued to grow during the year but at a slower rate than in the preceding two years; in non-farm industries, the increase from 1948 to 1949 was less than 2%. Employment in manufacturing was decreasing slightly during the year mainly because of declines in the durable goods industries.

No appreciable increase occurred in the number of apprentices available during the year and net immigration of skilled workers fell to about 6,400 from 11,500 in 1948. Except for the scattered shortages mentioned above, however, the supplies of skilled tradesmen appeared sufficient to meet requirements.

Korean Defence Buildup, 1950-53

The second period of rapid economic expansion in the postwar decade began in 1950 and continued until the third quarter of 1953. Shortages of skilled tradesmen became widespread and acute once again. By 1951, four of the occupational groups listed in Chart II were in shortage throughout the year, and another 11 were in shortage for half the year or more. In 1952, these shortages had eased considerably, although for half the year, five occupational groups were still in shortage; by 1953, only engineers were scarce throughout the year and other shortages were scattered and of short duration.

The upswing that had already begun during the first half of 1950 gained momentum after the outbreak of hostilities in Korea in June of that year, but the full impact of heavy defence expenditures was not felt until late in 1951. National expenditures in constant dollars increased by 25% from 1949 to 1953. Most of this increase occurred in the years 1950-52, averaging an annual rate of increase of about 6.3%. The rising trend in expenditures was accompanied by a rapid gain in output in all industries. The volume of industrial production rose by almost 25% from 1949 to 1953; manufacturing production increased by more than 20%.

In line with the rapid increases in expenditures and production, total employment also rose between 1950 and 1953, by 5%. The agricultural labour force continued to decline during this period but non-farm employment increased by more than 10%. From 1951 to 1953 the economy operated at full employment levels, and since the growth in the labour force was smaller than the growth in employment, unemployment decreased

further. On the average, the number of persons without jobs and seeking work during these years, was only about 2.3% of the labour force.

The unusually sharp increases in employment in these years were particularly evident in industries employing large numbers of skilled workers. The rise in employment was much more rapid and continuous in durable goods than in non-durable goods industries. At the end of 1952, employment in durable goods (on a seasonally adjusted basis) was almost 25% higher than in 1949. In addition, defence contracts in the durable goods industries required elaborate tooling procedures and many short runs of complex military items. This kind of production programme created unusually heavy demands for skilled tradesmen of many kinds, particularly in the metalworking occupations.

These developments were reflected in the nationwide shortages recorded in Chart II for machinists, tool makers and die setters in each quarter from the fourth quarter of 1950 to the first quarter of 1953. Since then, there have been no general shortages of these key skills. Shortages also persisted during much of the period for other machine shop workers, sheet metal workers and welders; and numerous local shortages occurred in most other metal trades.

The defence programme and the expansion of consumer durables production also led to extensive shortages in electrical occupations, in radio manufacturing and in the electrical machinery occupations. In addition, the mushrooming of the aircraft industry created intensive and persistent shortages of skilled aircraft workers.

Employment in construction and mining increased steadily, reaching a peak in mid-1952, after which it began to decline. Despite increasing requirements for skilled construction tradesmen during the period, however, no countrywide shortages occurred after 1950 largely because of the influx of immigrant skilled construction workers.

The increase in the number of registered apprentices from about 5,400 in 1950 to about 5,800 in 1953 (see Table 11) did not contribute appreciably to meeting increased requirements for skilled construction tradesmen during those years. In fact, the ratio of apprentices to paid workers (3%) remained practically unchanged.

The net immigration of skilled workers increased from 3,706 in 1950 to 25,942 in 1951 and was roughly between 14,500 and 16,500 yearly in the following three years (see Table 21). Net immigration of skilled workers in the years 1950-53 totalled 60,787. The large numbers of immigrants who entered the country in 1951 could not be integrated into employment quickly enough to meet the great increase in requirements that occurred in that year. However, the skilled tradesmen who came at that time contributed markedly to easing shortages in 1952 and 1953, despite the

continued expansion of many industries requiring large numbers of skilled workers. Had it not been for the unusually large addition of skilled workers to the labour force during this critical phase of the defence production programme, shortages would have been extremely severe and would undoubtedly have had a disruptive effect on many industries.

It is unlikely, in the course of normal peacetime expansion of the economy, that requirements for skilled workers would increase to the extent and at the rate they did between 1949 and 1953. However, this rather unusual demand situation must be considered in relation to the equally unusual short-run increase in the supply of skilled workers from immigration, particularly after 1950. This suggests that sharp increases in the demand for skilled tradesmen in the sectors of the economy employing such workers will result in shortages unless very ample supplies of new tradesmen are forthcoming on a continuing basis.

Recession, 1953-54

After more than two years of steady expansion, economic activity reached a peak in the third quarter of 1953 and then declined for the following 12 months. Although national expenditures did not decline in all sectors, they did decrease in most major ones. The major factors were decreases in investment expenditures on new machinery and equipment and heavy net liquidation of inventories. Other decreases on a smaller scale occurred in personal expenditures on durable goods, in government expenditures and in investment in non-residential construction.

The drop in production resulting from these changes was centred largely in the manufacturing industries. Total employment also fell during this period, the decreases being largely concentrated in non-agricultural industries, particularly the manufacture of durable goods.

During these 12 months, no continuous widespread shortages were recorded in any of the occupations listed in Chart II, except that of engineers where the shortage persisted throughout the year. Scattered local shortages of farm workers, loggers and plasterers, however, were recorded. Since the last quarter of 1953, nationwide shortages of skilled tradesmen in manufacturing and construction have practically disappeared, although local shortages have developed from time to time in various occupations. The context of this discussion requires little if any comment about this period, for the recession in economic activity meant that requirements for skilled tradesmen were either declining or remaining stable.

Rapid Employment Expansion, 1955-56

The mild recession in economic activity ended in the third quarter of 1954 and was followed by a period of sharp recovery and expansion that

continued throughout 1955 and 1956 and into 1957. The rate of economic growth was most rapid during the first half of 1955, and for the year as a whole the average increase in the volume of production was greater than in any other single year in the postwar decade. National expenditures in constant dollars increased by 9% from 1954 to 1955. The gain was spread over most sectors of the economy but the most rapid increases were recorded in consumer expenditures for durable goods and for new residential construction.

The patterns of investment expenditure during this period changed somewhat. In construction, the shift was from housing to industrial construction; in federal defence expenditures, the change was from aircraft, ship-building and munitions to electronic equipment and construction work. One important factor contributing to the increase of national expenditure in these two years was the change from a liquidation of business inventories in 1954 to a substantial and apparently voluntary inventory accumulation in 1955.

The volume of industrial production increased by almost 9% from 1954 to 1955. Expansion was most marked in mining, particularly in petroleum extraction and non-metal mining. In manufacturing, the volume of production rose by more than 7%, the most striking increases being in the durable goods industries, particularly iron and steel products, non-metallic minerals and electrical apparatus—all industries that employ large numbers of skilled tradesmen.

The employment trends in 1955-56 reflected these economic developments. From the fourth quarter of 1954 to the fourth quarter of 1955, the non-seasonal increase of non-farm employment amounted to almost 8%. In manufacturing, the employment increases were much sharper in the durable than in the non-durable goods industries. Construction employment also began to rise in the last quarter of 1954 and, after a temporary decline in the early months of 1955, reached a record level by midsummer. The employment expansion of 1955 was the sharpest recorded in the postwar period and was concentrated very largely in industries such as durable goods manufacturing and construction which employ relatively large numbers of skilled tradesmen.

Smaller employment increases in other postwar years had previously produced countrywide shortages of skilled tradesmen in a number of occupations. As Chart II shows, however, no such widespread shortages developed in 1955, although some scattered short-term shortages did occur.

The explanation of this rather remarkable absence of labour shortages during the employment expansion of 1955 must be sought on the supply side of the skilled labour market. How had the picture changed since the expansion period of 1950-53?

Apprenticeship training showed no dramatic change and as in earlier years did not contribute greatly to meeting requirements for skilled tradesmen, although the number of apprentices enrolled for training did increase slightly. Between 1950 and 1955, for example, only 6,058 registered building trades apprentices reached journeyman status in Canada (excluding Quebec).

The immigration picture, however, was quite different. Between 1946 and 1950 gross immigration of skilled workers (excluding miners) amounted to 35,019. During the next five years, it increased by some 150% to 93,677. The net immigration of skilled workers during these two periods was 28,216 and 80,131 respectively. The relative importance of immigration can be judged from the fact that the net number of skilled tradesmen (excluding miners) who immigrated to Canada from 1951 to 1955 represented 10.8% of the number reported in these occupations in the 1951 Census.

It is estimated that 53,763 skilled immigrants in the manufacturing and mechanical occupations entered Canada during these five years; this represented 11.4% of the Census total for these same trades in 1951. In construction, immigration played an even more important part. Between 1951 and 1955, 35,736 skilled construction workers are estimated to have entered Canada, representing some 18.2% of those reported in these trades in the 1951 Census.

Immigration, therefore, played a major role in building up the stock of skilled workers in Canada. It should also be remembered that little if any pressure was placed on skilled manpower supplies in 1954. This, together with heavy immigration, resulted in a very substantial increase in the economy's resources of skilled manpower and enabled the expansion of 1955-56 to take place with relatively little strain and without any nationwide shortages of skilled tradesmen.

The fundamental inadequacy of industrial training resources in Canada, in relation to the high requirements of the economy for new skilled tradesmen during periods of rapid expansion, was obscured by the very large immigration of these years. In fact, had it not been for immigration on this very large scale, very intense countrywide shortages would undoubtedly have developed in many of the skilled occupations.

Recruitment of Skilled Tradesmen by Canadian Manufacturing Industry

The absence of marked labour shortages during the 1955 expansion is confirmed by the results of a survey carried out in 1956 by the Department of Labour. Questions relating to the extent of labour shortages and the sources of supply of skilled tradesmen for Canadian industry were asked in the Department's 1956 *Working Conditions Survey*. The firms surveyed

were asked to indicate the extent to which their requirements for skilled tradesmen were not met in the 12-month period ended April 1956. The replies to this question, from a sample of 3,183 manufacturing firms are shown in Table 1.

Table 1

EXTENT TO WHICH REQUIREMENTS FOR SKILLED TRADESMEN WERE NOT FULLY MET, APRIL 1955-56

	Percentage of requirements not met	Number of firms	Percentage of total number of firms
1-25.....		237	7.4
26-50.....		44	1.4
Over 50.....		30	0.9
Total not satisfied.....		311	9.7
Total number in sample.....		3,183	—

SOURCE: Economics and Research Branch, Dept. of Labour.

Only about 10% of the firms surveyed indicated that they had been unable to fill their requirements for skilled tradesmen from available supplies. This tends to support the conclusion reached from an analysis of the ratio of vacancies to job registrations at National Employment Service offices, namely, that the record employment expansion of 1955-56 led to only limited and local shortages of skilled tradesmen in the Canadian economy.

The firms surveyed were also asked to indicate the percentage of their requirements for skilled tradesmen that were met during the preceding 12 months by organized trade training within the firm; informal on-the-job training or upgrading; hiring of qualified Canadian skilled workers; and hiring of qualified non-Canadian skilled workers (*i.e.*, immigrants entering Canada within the past five years). The results of this question are shown in Table 2. Since firms usually obtain their skilled workers from more than one source, many firms, of course, are included more than once in the tabulation.

The results of the survey indicate clearly that organized trade training plays a relatively minor role as a source of new skilled tradesmen. Only 24% of the firms reported that they obtain any tradesmen from their own training programmes, and only 10% met more than half of their requirements from this source.

Informal on-the-job training or upgrading played a considerably larger part than formal apprenticeship or other organized training programmes in meeting requirements for skilled workers. Fifty-nine per cent of the firms indicated that they met some part of their requirements from this source and some 32% met more than half their requirements in this way.

Table 2

METHODS USED BY MANUFACTURING FIRMS IN MEETING REQUIREMENTS FOR SKILLED TRADESMEN, 1955-56

Percentage of requirements for skilled tradesmen met by each method	Methods					
	Organized trade training		Informal on-the-job training (upgrading)		Hiring of qualified Canadian workers	
	Number of firms	Percentage of firms	Number	%	Number	%
100.....	182	6	610	19	524	17
75-99.....	95	3	315	10	330	10
51-74.....	40	1	93	3	172	5
26-50.....	152	5	354	11	481	15
1-25.....	301	9	496	16	619	20
0.....	2,413	76	1,315	41	1,057	33
Totals.....	3,183	100	3,183	100	3,183	100

Source: Economics and Research Branch, Dept. of Labour.

The hiring of qualified Canadian skilled tradesmen proved to be by far the most common way of meeting requirements in the firms surveyed. Sixty-seven per cent of the firms reported that they obtained skilled tradesmen from this source and 32% obtained more than half their requirements in this way. In fact, 17% reported that this was their sole source of skilled tradesmen. These workers must, therefore, have been either unemployed at the time they were hired or employed by another firm. In either case, there was no net addition to the pool of skilled tradesmen. It must be kept in mind, however, that at least a part of the movement of workers from job to job, rather than representing a waste of skilled labour, often adds to the experience and skill of the worker and so benefits the productive power of the economy.

Thirty-three per cent of the firms reported that they had met some of their requirements by hiring immigrants, and 4% indicated that more than half their requirements were met this way. In view of the fact that net immigration of skilled tradesmen totalled some 110,000 in the first postwar decade, these percentages probably understate considerably the extent to which immigrants have met requirements for skilled workers. In many cases, employers would not be aware of whether a worker had entered Canada within the preceding five years or earlier. In general, therefore, the employers in the survey were probably referring to more recent immigrants and it should be recalled in this connection that the immigration of skilled workers dropped sharply from the annual rate of 18,000 to 19,000 during 1952-54 to about 11,000 in 1955.

The hiring of skilled tradesmen who were already qualified was apparently not simply a matter of robbing Peter to pay Paul. Had this been so, far more than 10% of the employers would have reported inability to fully meet their requirements for skilled tradesmen. This tends to suggest that skilled immigrant workers, on first coming to Canada, may have taken jobs that did not fully measure up to their qualifications. Subsequently, with the considerable expansion of requirements for skilled workers in 1955-56, they may have come forward to fill the demands of other employers for skilled tradesmen and been replaced in their former jobs by less skilled workers. If this supposition is correct, it suggests that for a time at least, immigrant skilled tradesmen can, in effect, be stockpiled in jobs of lesser skill and be available to meet expanding requirements as they arise.

Professional Manpower

The factors affecting the manpower situation for professional workers are considerably different from those affecting skilled workers, particularly on the supply side of the labour market. In general, supplies of new professional workers depend much more on graduations from Canadian universities than

on immigration, whereas immigration played a major role in filling requirements for skilled workers, at least during the last five years. Professional manpower shortages tend to follow a pattern that parallels that of university graduations; shortages develop when graduations are relatively low and diminish when graduations increase. This can be seen from Chart VI, which shows the positive relationship, for engineers, between the extent of shortages and the level of university graduations.

In the years immediately following World War II, shortages developed of many kinds of professional workers. From 1949 to 1952, supplies were more adequate and the situation eased, but since then, shortages of professionals, particularly of scientists and engineers, have once again appeared.

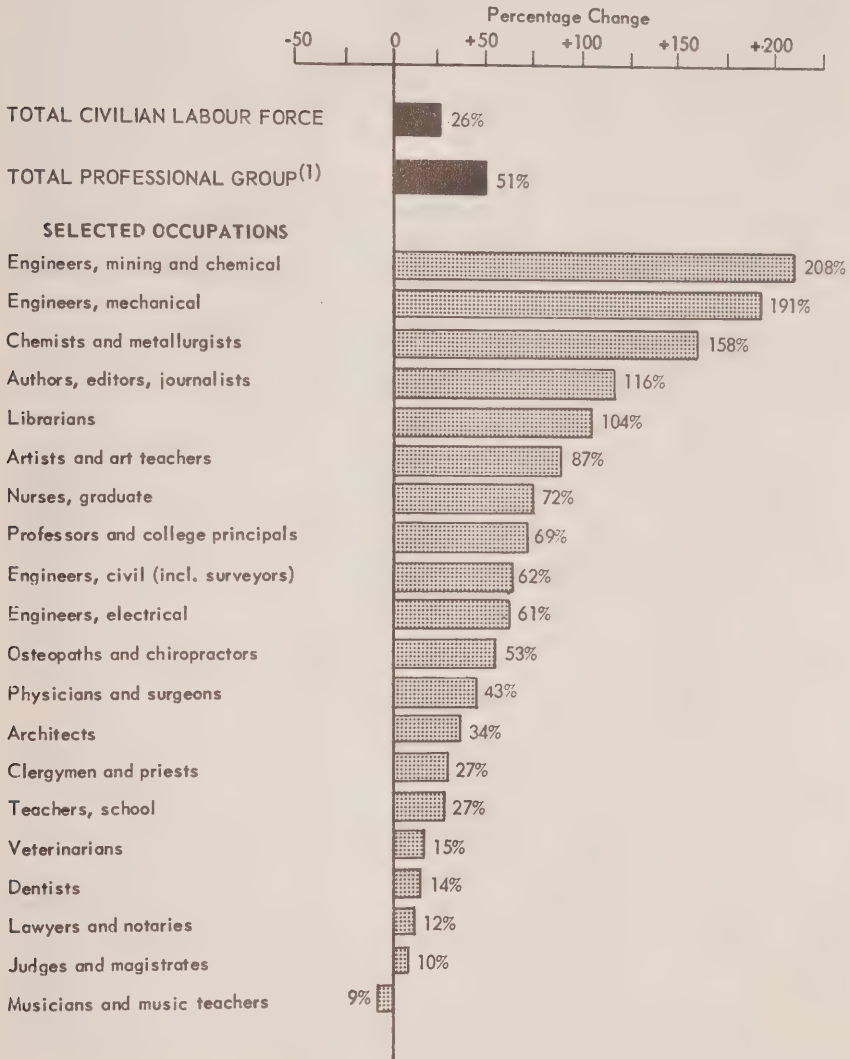
The remainder of this chapter deals mainly with the supply and shortages of engineers and scientists, since these are the fields in which the most intense shortages have developed and since they are also more strategic to economic development than many of the other professions.

The economic developments of the past ten years placed increasing pressure on supplies of certain kinds of professionals, particularly in engineering and science and in the fields of commerce and business administration. The rate of growth for various professions is given in Chart III which also shows that the number of persons considered to be in professional occupations for the purposes of this report increased by 51% between 1931 and 1951. The largest increase during this period, 208%, was of mining and chemical engineers, reflecting the large-scale development of primary resource industries. Mechanical engineers increased by 191% as manufacturing industries expanded and became more complex. Of the other professions in the chart, only authors, editors and journalists, and librarians increased by more than 100%. In other words, the demands for professionals during these years were concentrated heavily in the engineering and scientific fields.

Since the early 1900's, Canada, in evolving from a predominantly agricultural country to one based on the exploitation of many primary raw materials and on growing manufacturing and service industries, has required increasing numbers of scientists and engineers per unit of the economy's output. In addition, economic progress depends to a growing extent on the application of new scientific knowledge to production processes. The impact that advancing technology and a dynamic economy can have on a country's requirements for scientists and engineers is well illustrated by developments in the United States. Between 1930 and 1954, the number of scientists and engineers in the United States increased by 226%, while the population as a whole increased only by 32%.¹

¹National Science Foundation, *Scientific Personnel Resources*, Washington, 1955, p. 9, Table A-5.

Chart III
GROWTH IN PROFESSIONAL OCCUPATIONS, PERCENTAGE CHANGE 1931 - 1951



(1) See Table 6.

Source: Census of Canada and Labour Force Survey, D.B.S.

Chart II shows that engineers have been in short supply during most of the postwar decade, a situation that has not been equalled either in extent or in continuity by any other occupational group (for which statistical data are available). There is little doubt, therefore, that the shortages have been most pronounced in the engineering fields. The reports received by the Department of Labour from field representatives who regularly interview industrial executives support this evidence.

Data on recent trends in requirements for various professional categories are available from surveys conducted by the Department of Labour in 1952, 1954 and 1956.

The 1952 survey covered 417 firms, employing some 15,000 professionally trained persons and whose total employment represented almost 14% of wage and salaried workers in Canada. Of the 417 firms surveyed, 214, employing well over two-thirds of the professionals covered, provided figures on the number of professionals on their payrolls from 1950 to 1952. In this group of firms, electrical and mechanical engineers were employed in the largest numbers and chemists and commerce and business administration graduates were also employed in substantial numbers.

The expansion of production following the outbreak of the Korean war, particularly in industries producing defence items, and the rapid increase in natural resources development, resulted in an exceedingly heavy demand for the services of engineers and scientists. The 1952 survey shows that in the firms covered, hirings of professionals in 1950 equalled 13% of the total number of professionals on their staffs in 1952 and increased to 16% in 1951.² Similarly, hirings of chemical engineers increased from 11% to 18% of the 1952 total from 1950 to 1951; those of civil engineers from 7% to 16%, and those of mechanical engineers from 14% to 20%.

Coverage of the 1954 and 1956 surveys was considerably broadened. The 1954 survey covered 774 industrial firms that together employed more than 17,000 professionally trained persons; and nearly 20,000 professionals were employed in the 720 industrial establishments covered by the 1956 survey. In these two surveys, the demand for professional personnel was assessed for the first time in terms of the net additional requirements rather than, as in 1952, in terms of total hirings which included not only hirings of additional personnel but also hirings to fill vacancies arising from retirements and resignations. The percentages based on the 1954 and 1956 surveys are therefore not comparable with the 1952 figures, representing gross hirings, but they are more meaningful as a measure of the additional requirements for professionals.

On the basis of the 1954 survey, conducted early in that year, the requirements for engineers on the part of industry were expected to increase

²These percentages refer to gross hirings which include replacements for retirements and resignations

on the average by 7.6% each year during 1954, 1955 and 1956. As shown in Table 3, the highest increase in requirements, 9.1% annually, was expected for mechanical engineers and increases of 8% or more were anticipated for geological, mining, electrical and chemical engineers. Requirements for civil engineers were expected to grow more slowly, at an average rate of 4.6% per year. Civil engineers, however, had been in greater supply than most other kinds of engineers so that employers had been able to meet their needs in this field more readily. It is possible, therefore, that their prospective requirements for civil engineers did not include any backlog of unfilled vacancies, whereas in some of the other engineering fields this could have been the case.

The results of the next survey in the spring of 1956 made it apparent that there was a marked strengthening in industry's requirements for engineers since the 1954 survey was taken. In 1956 employers were asked to indicate not only their prospective requirements for 1956-58 but also to report the changes that actually occurred during 1955. Their returns showed that during 1955 the employment of engineers in industry increased by nearly 11%. For the next three years, 1956-58, the increase in requirements was expected to be even greater, averaging a little over 12% from year to year. As shown in Table 3, this rise in demand, presumably arising from expansion of economic activity in 1955-56 affected nearly all engineering categories, although in some fields the uptrend had not yet appeared in 1955. It is possible, however, that in these fields the actual employment gains during 1955 may have been restricted by the limited supply of professional workers.

Table 3

REQUIREMENTS FOR ENGINEERS AS REPORTED BY INDUSTRIAL ESTABLISHMENTS, 1954-58

Engineering field	Percentage net increase in requirements ^a		
	Annual average increase anticipated in 1954 for 1954-55-56	Actual increase reported for 1955	Annual average increase anticipated in 1956 for 1956-57-58
All engineers.....	7.6	10.8	12.2
Aeronautical.....	—	20.5	13.7
Chemical.....	8.2	11.2	14.3
Civil.....	4.6	12.4	10.8
Electrical.....	8.0	5.8	9.2
Geological.....	8.4	8.3	13.4
Mechanical.....	9.1	14.6	15.0
Metallurgical.....	7.3	19.3	12.8
Mining.....	8.1	5.3	6.9

^a The percentages shown represent anticipated or actual changes in the number of engineers employed by the reporting establishments over the periods specified. They do not refer to total hirings which would also reflect needs arising from retirements, transfers or resignations. Thus, for instance the 11.2% increase in requirements for chemical engineers in 1955 indicates that the reporting establishments employed 11.2% more chemical engineers in 1955 than they did at the end of 1954. Similarly, the increase of 14.3% for 1956-58 indicates that by the end of each of these years they expected to have on the average 14.3% more chemical engineers in their employ than at the end of the preceding year.

Table 4

REQUIREMENTS FOR ENGINEERS AND SCIENTISTS, 1955-58

Employment sector	Percentage net increase ^a	
	Actual 1955	Forecast annual average 1956-57-58
Engineers, all sectors.....	9.9	11.4
Industry.....	10.8	12.2
Colleges and universities.....	8.7	6.8
Government agencies.....	4.9	7.7
Scientists, all sectors.....	5.6	9.8
Industry.....	6.5	12.2
Colleges and universities.....	7.1	7.2
Government agencies.....	3.0	6.7

^a See footnote to Table 3.

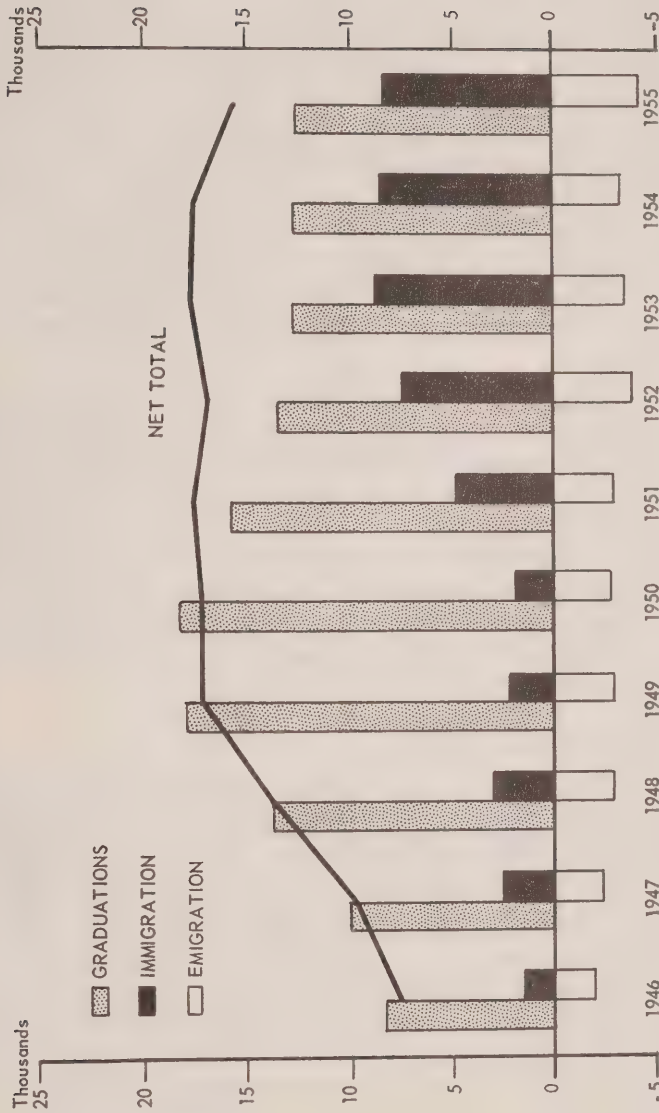
SOURCE: Economics and Research Branch, Dept. of Labour.

In addition to the industrial sector, the 1956 survey covered also federal and provincial government agencies and colleges and universities. As shown in Table 4, the requirements for engineers in these two sectors, both major employers of professionally trained personnel, were expected to increase at a lower rate than in industry. Much the same pattern was also evident in prospective requirements for scientists, *i.e.*, a group including biologists, chemists, geologists, mathematicians and physicists. While employers in industry estimated that during 1956-58, their requirements for scientists would increase at the same average annual rate as for engineers (12.2%) government agencies and colleges and universities anticipated an increase of only about 7%. In terms of the over-all demand, calculated with regard to the actual distribution of each category of professional personnel among the three sectors, requirements for engineers during 1956-58 were expected to increase 11.4% annually and those for scientists 9.8%.

Supply in Relation to Shortages of Professional Personnel, 1946-56

The supply of new professionals depends mainly on current graduations from universities and colleges, plus immigration, less emigration. It should be remembered, however, that not all university graduates become professionals and not all professionals are university graduates. Even when the number of persons who have indicated professional qualifications on entering Canada is added to the number of graduates from Canadian universities, the total does not necessarily indicate the total volume of available new supplies. Many of the immigrants classified as professionals cannot immediately qualify for positions to which their education and training might entitle them because of language difficulties, differences in background and other limitations. On the other hand, most Canadians in these categories who emigrate to the United States are already qualified professionals. The net gain of qualified professionals, therefore, is somewhat smaller than the subtraction of emigration estimates from immigration estimates might indicate.

Chart IV
SOURCES OF PROFESSIONAL PERSONNEL:
GRADUATIONS AND APPROXIMATE NET IMMIGRATION, CANADA, 1946-1955



Source: Tables 9 and 20

Chart IV shows the extent to which the various sources of professional persons contributed to supplies for each year of the postwar decade. It indicates that when net immigration is added to graduations the supply curve is much more stable than if graduations alone were considered. In 1946 and 1947, graduations were low and emigration was greater than immigration so that the total supply was considerably smaller than in later years. This small supply of new professionals, in conjunction with increasing requirements, accounts in large measure for the rather severe shortages that were felt in most occupational groups in the years 1946, 1947 and 1948. Following this dearth, supplies rose rapidly to a peak of about 16,700 in 1950, mainly as a result of increased graduations from veteran enrolments. Fortunately, when graduations began decreasing after 1950, immigration increased and served to maintain the supplies of professionals at about 16,000 to 18,000 yearly in subsequent years. In other words, immigration helped considerably to fill the gap in supplies that resulted from decreasing graduations.

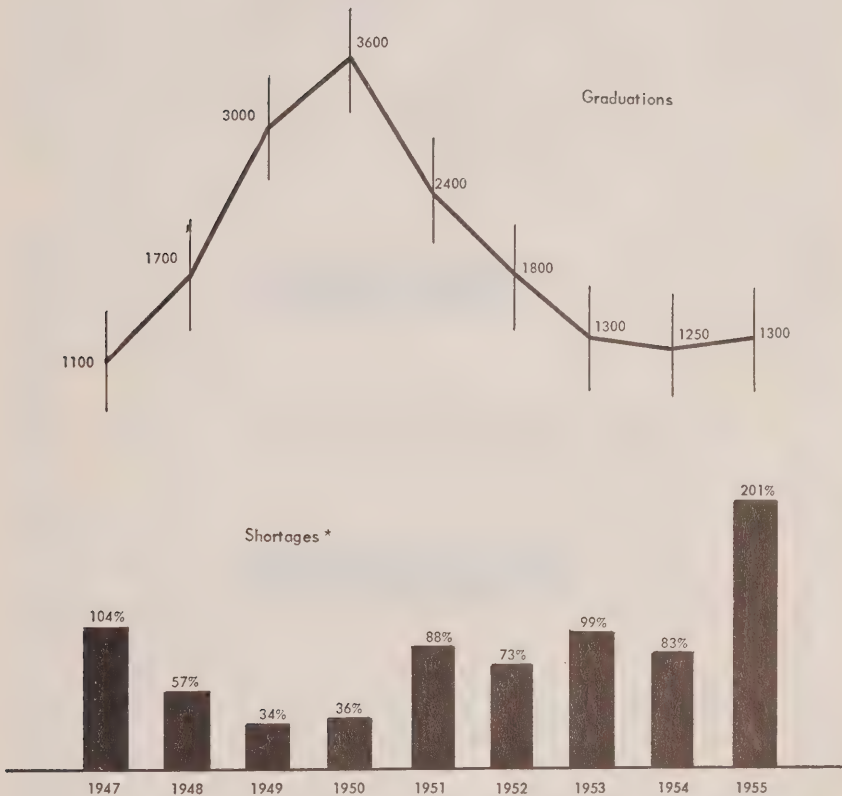
Although total supplies of professionals were maintained with the help of immigration, some shortages developed in certain professional categories because of rapidly growing requirements. Among these were the health professions, teaching, business administration, engineering and science. Immigration helped to alleviate certain of these shortages but it made much greater contributions in some professional categories than in others. Thus, while immigration of professionals helped to ease the shortages in certain professional categories it by no means solved the over-all problem. This is in marked contrast to the situation for skilled tradesmen in which immigration contributed to a much larger extent in satisfying requirements.

Engineers and Applied Scientists

Chart V indicates the extent of shortages of engineers from 1947 to 1955. The degree of shortage of engineers is closely related to the variation in the number of graduations from engineering and applied science courses. Shortages in these fields have increased in intensity since 1952-53 and were more severe in 1955 than in any other postwar year.

The degree of shortage of engineers began increasing noticeably in 1951, after some three years of reasonably satisfactory balance between supply and demand. Demand eased somewhat during the recession of 1954, but shortages again became more intense in the last quarter of that year and have continued since. With regard to supplies, engineering and applied science graduations reached a high point of about 3,600 in 1950, dropped to about 1,250 in 1954 and rose slightly to 1,340 in 1955. Graduations, therefore, reached a low point just when economic expansion was heading for a record peak. As a result, shortages, that had already begun to increase in 1951, were much more intense in 1955 than five years before.

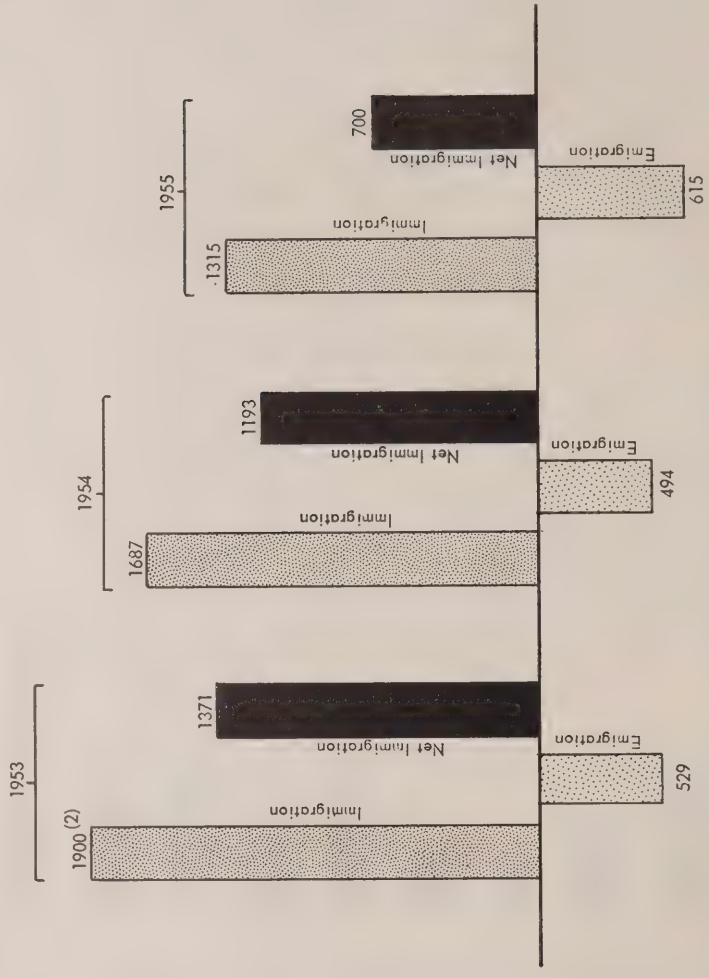
Chart V
ENGINEERS: GRADUATIONS AND SHORTAGES, CANADA, 1947 - 1955



* The degree of shortage has been calculated from N.E.S. data. The figure of employers registering vacancies is presented as a percentage of the number of persons applying for work. 100% represents a situation in which vacancies are exactly equal to registrations. If vacancies exceed registrations this percentage exceeds 100.

See also pages 10-11 and Table 9.

Chart VI
ENGINEERS: IMMIGRATION AND EMIGRATION, CANADA, 1953 - 1955(1)



(1) Emigration to the United States only.
(2) Immigration total for 1953 is an estimate based on actual figures for nine months.
Source: Canada, Department of Citizenship and Immigration. U.S., Department of Justice.

The net immigration of engineers must also be added to the supply of engineers from graduations, keeping in mind of course, the limitations mentioned earlier to which immigrants are subject. Chart VI shows the net gain of engineers from immigration less emigration for the years 1953 to 1955 (earlier figures are not available). As the chart indicates, the net gain has decreased in each of these years. Furthermore, if the approximate net gain from immigration is added to the number of engineering graduates from Canadian universities, the figures are approximately 2,700 for 1953, 2,400 for 1954 and 2,000 for 1955. It is clear then, that since 1953, the supply of new engineers has shrunk each year, not only because of the drop in university graduations but also because of a decrease in the net gain of engineers from immigration. In 1955 in particular, this decline in supply coincided with an exceptionally high increase in economic expansion which led to unusually high requirements for the services of engineers and consequently produced unusually severe shortages.

It should perhaps be noted, however, that many engineers in Canada and not performing purely engineering functions. Of the engineers listed in the Technical Personnel Register of the Department of Labour, approximately one-third were engaged in functions other than engineering in 1956. These included administrative and executive functions, supervision and management, or sales and service functions.

Effects of Shortages of Professional Workers in Canadian Industry

As this study shows, during the past decade intense shortages have occurred of certain kinds of professional workers, particularly engineers, scientists and graduates in commerce and business administration. Have these shortages adversely affected Canadian industry? General labour shortages and sometimes shortages of skilled manpower can have beneficial effects on productivity, for management is spurred to overcome the shortages by installing new machinery, diluting jobs so that less skill and training are required, developing more highly integrated production techniques and generally utilizing existing labour supplies more effectively. The possibility of offsetting shortages in such beneficial ways as these is much slimmer in the case of professional workers who mainly perform functions for which the installation of machines is no substitute and who cannot easily be replaced by technicians or by persons with non-professional training, either because such persons are not available or because opportunities for their effective utilization are limited.

In attempting to obtain more detailed information on this subject, the 1956 survey of requirements for professionals included the following question: "If you have experienced shortages of professionally trained personnel, explain briefly the effect which these shortages have had upon your work

volume, research activities, etc.” Roughly 50% of the total number of industrial establishments surveyed reported shortages of professional staff and described the effects of these shortages on their operations. Of these, nearly half (43%) stated that shortages were resulting in the curtailment of production and expansion plans. The curtailment of development and research activities and the overloading of personnel were also given as serious effects of shortages and about 10% of the firms responding stated that shortages forced them to fill positions with inadequately trained personnel and created a potential shortage of future executives.

The progress of the economy can be seriously impaired by shortages of professionals, for when the supply is insufficient, productivity tends to fall and production costs to rise, new products fail to be introduced, technological changes cannot be made rapidly enough to meet competition, and professional staffs are overloaded, thus having far-reaching repercussions on current management decisions and on efficiency and morale in future years.

Summary

In the 10 years after World War II, the Canadian economy expanded steadily. The rate of expansion was, however, not even and the decade was punctuated by periods of particularly rapid economic growth. It was during these periods of accelerated activity in nearly all sectors of industry that shortages of skilled and professional manpower became most widespread and most acute. At other times, except for isolated occupations in specific areas, the shortages virtually disappeared.

The first five years of the decade were characterized by the conversion of the economy from a wartime to a peacetime basis. Shortages did become widespread and acute in certain occupations during this period. The large numbers of graduations from Canadian universities as a result of heavy veteran enrolment helped to increase the supply of professional manpower at this time and, to some extent, the skills acquired by some workers during the war helped to ease certain shortages. But, in general, the shortages of skilled tradesmen were prolonged and fairly intense; and apprenticeship and other training programmes in Canada did not begin to meet the requirements that existed during these years.

In the second five years, on the other hand, immigration of large numbers of skilled workers greatly alleviated the shortages in many trades, and except for short periods and in specific occupations, the acute shortages of the preceding five years did not recur. Professional workers, however, were in very short supply. University graduations had dropped from the high level of 1950-51 and demand for professionals was still rising. Furthermore, immigration did not, as in the case of skilled tradesmen, help to alleviate the shortages to any marked degree.

SOURCES OF SPECIALIZED MANPOWER

THERE ARE THREE basic sources of specialized manpower: formal training, either in school or industry, apart from general elementary and secondary education; immigration of specialized workers who have acquired training and experience in other countries; and upgrading through a process of experience acquired at work. It is important to distinguish clearly among these three sources, for the steps taken to meet Canada's requirements for specialized workers should depend on the adequacy and character of the sources from which various kinds of specialized workers can be drawn. specialized workers should depend on the adequacy and character of the power resources, because it requires formal training, many years of experience, or a combination of both to maintain or increase these resources. The supply of specialized manpower can be increased quickly only through immigration.

Professionals—Although all three sources contribute, in varying degree, to the resources of professional, technical and skilled manpower, it is professional manpower that is mainly characterized by a long period of formal training, usually in universities. In some professional occupations, however, on-the-job experience, usually supplemented by some kind of formal training, produces professional workers who are considered to have the equivalent of a university education. Under the pressure of severe manpower shortages, this source of professional manpower may grow in importance in the future for at least some occupations. In the postwar period, immigration has also been an important source of many kinds of professional workers, and in the face of shortages, many Canadian employers have recruited overseas.

Technicians—Particularly in the health, engineering and scientific fields, specialized post-secondary education is regarded as an important qualification for technicians. Under the pressure of shortages, however, formal qualifications have often fallen below desirable standards and many technicians have acquired their skills through informal on-the-job training.

Skilled Tradesmen—In the postwar period, on-the-job training, immigration and formally organized training, probably in that order of importance, contributed to Canada's resources of skilled tradesmen, although the contribution of these sources varies greatly from one occupation to another.¹ For some occupations, skilled tradesmen are recruited almost solely from among workers with on-the-job experience; in others a considerable amount of formal training is characteristic. A number of occupations depend heavily on apprenticeship training as a source of supply. These tend to be occupations which have traditionally relied on this type of training.

Apprenticeship, a system of training originating with the mediaeval guilds, varies in length in Canada from two to five years depending on the occupation. Several of the skilled building trades and a number of the manufacturing trades, including metalworking and printing, are typically apprenticeship trades. Essentially, apprenticeship is a combination of organized on-the-job experience and classroom or other organized instruction relating to the trade.

Many skilled tradesmen are a product of formal vocational education at the secondary school level, either in technical institutions or in vocational high schools, where a combination of theoretical knowledge and practical experience is given. Such youths are then employed as helpers or learners in their trade and, after several years of on-the-job experience, become fully qualified tradesmen.

Other skilled tradesmen acquire their training almost entirely by on-the-job experience, starting out as learners or helpers and gradually moving up the skill hierarchy to become fully qualified tradesmen. Many of these workers supplement their experience by formal training through night classes and correspondence courses. This kind of training usually means, however, that a long period may elapse between the time of entry into the trade and the time of reaching the status of a fully qualified journeyman.

As shown in Table 5, the 1951 Census reported 787,000 workers—15% of the civilian labour force—in occupations that can be classified as skilled.² In the same year, the number of workers in occupations considered to be professional in accordance with the general definition used in this Report was estimated to be 303,000, or some 5.8% of the labour force (see Table 6).³ Relatively little information is available on the third segment of specialized manpower—technicians—because the occupational classification of the 1951

¹The Dept. of Labour is surveying a sample of tradesmen in several different occupations to find out the importance of the various sources and how their contribution varies from one occupation to another and from one period to another.

²Occupations shown in the Census have been grouped together to conform as closely as possible to the general definition of skilled workers used in this Report (see pp. 6-7), but difficulties inherent in the nature of Census data made it impossible in many cases to draw a clear dividing line. Thus some of the occupational groups designated as skilled include a number of semi-skilled workers, while some skilled workers are in groups that were excluded from this list. For a complete listing of Census groups regarded as skilled see Table 5.

³For the general definition of professional workers, see pp. 8-9. The Census occupations conforming most closely to this definition are listed in Table 6.

Census only partially singles out this group of workers. Laboratory technicians and draughtsmen and designers, for example, some 27,000 in all, were enumerated separately, while technicians in other fields were classified in occupations regarded in this study as skilled. In 1951, Canada's resources of specialized manpower, professional, technical and skilled, numbered some 1,117,000 or approximately 21% of the civilian labour force.

Table 5

SKILLED WORKERS IN CANADIAN LABOUR FORCE, 1931-51

Number of workers		Occupation group and class	Number of workers	
1931	1941 ^a		1951	
38,162 ^e	57,086 ^e	Mining and quarrying.....		39,894
		Foremen.....	4,725	
		Miners.....	29,817	
		Quarriers; drillers — rock, oil wells.....	5,352	
		Manufacturing and mechanical		
14,929	22,127	Foremen.....		50,849
3,657	4,772	Furriers.....		5,774
7,454	8,469	Shoemakers and repairers, n.i.f.....		6,254
1,624	3,418 ⁱ	Inspectors and menders (textile).....		5,212
423	747	Loom fixers and card grinders.....		1,156
7,139	9,965	Weavers (textile).....		9,002
3,036	3,918 ⁱ	Cutters.....		4,799
2,798	2,139 ⁱ	Milliners.....		1,481
12,199	10,924	Tailors and tailoresses.....		9,169
8,980	10,885	Dressmakers and seamstresses, n.i.f.....		14,237
2,282	4,021	Inspectors, graders, scalers (wood prod.).		6,293
3,738	4,392	Cabinet and furniture makers.....		6,985
3,369	3,890	Upholsterers.....		5,117
2,949	3,605	Paper makers.....		6,497
1,759	2,153	Engravers ^b and lithographers.....		3,523
19,969 ^e	21,105 ^e	Other occupations in printing and publishing.....		26,185
		Bookbinders.....	3,219	
		Compositors and typesetters.....	15,253	
		Pressmen and plate printers.....	5,588	
		Other printing and publishing occupations.....	2,125	
4,357	12,708	Inspectors and gaugers — metal.....		12,860
16,388	15,719	Blacksmiths, hammermen, forgemen....		9,587
3,575	4,584	Boilermakers and platers.....		4,579
9,797	17,824	Furnacemen, moulders, coremakers....		19,671
		Coremakers.....	2,089	
		Furnacemen and heaters — metal.....	8,040	
		Moulders.....	9,542	
605	1,167 ⁱ	Electroplaters.....		1,728
419 ^e	522	Heat treaters and annealers.....		762
3,404	4,572	Jewellers and watch makers.....		4,299
18,297 ^e	24,787 ⁱ	Machinists — metal.....		31,277
50,065	83,913	Mechanics and repairmen, n.e.s.....		135,531
		Mechanics — airplane.....	3,925	
		Mechanics — motor vehicle.....	64,328	
		Mechanics — railroad or car shop....	9,306	

Table 5 (Cont'd.)

		Mechanics, n.e.s.	53,169
		Radio repairmen.	4,803
3,360	4,924	Millwrights.	8,055
1,342	1,793	Patternmakers.	2,311
7,639	11,537	Sheet metal workers and tinsmiths.	13,750
2,851	7,276	Toolmakers, diemakers, setters.	9,443
2,895	2,027	Stone cutters and dressers.	1,896
356e	398e	Sulphite cookers and digester men.	698
1,086e	2,501e	{Dental mechanics.	1,510
		{Opticians; lens grinders and polishers. . .	1,356
22,146e	32,615e	Electric light and power and stationary engineers.	51,077
		Construction machinery operators, n.e.s. .	8,227
		Hoistmen, cranemen, derrickmen.	13,376
		Power station operators.	3,888
		Stationary engineers.	25,586
		Construction	
5,381	4,647	Foremen and inspectors.	13,186
11,248	9,448	Brick and stone masons.	15,845
40,886	47,227	Carpenters ^c	64,522
854	1,900i	Cement and concrete finishers.	2,946
21,552	24,281	Electricians and wiremen.	35,005
17,645	21,448	Painters, decorators, glaziers ^c	23,579
6,222	5,003	Plasterers and lathers.	9,270
17,469	20,968	Plumbers and pipefitters.	29,531
2,005	2,345	Structural iron workers.	1,838
		Transportation	
7,199	5,980	Foremen and inspectors.	14,221
335	702	Air pilots and navigators (civil).	1,141
3,760	3,732	Captains, mates, pilots.	4,601
4,673	4,260	Conductors, steam railway.	6,364
3,262	2,934	Engineering officers — ship.	3,236
7,920	7,185	Locomotive engineers.	9,366
5,948	5,428	Locomotive firemen.	7,254
		Communication	
7,928	8,658	{Foremen and inspectors.	1,564
		{Linemen and servicemen.	19,459d
506	1,418	Radio operators.	2,539
6,784	5,765	Telegraph operators.	6,625
		Service	
1,363	1,673	Motion picture projectionists.	1,944
455,989	587,485	Total skilled workers.	786,853

a Includes persons on Active Service.

b Includes photoengravers and engravers—metal products.

c Census figures for these occupations reduced by 50% because of a large semi-skilled component.

d Includes several occupations which in 1931 and 1941 were classified in other skilled classes shown here.

e Estimate.

i Interpolation.

n.i.f. Not in factory.

Figures exclude Yukon and Northwest Territories but include Newfoundland in 1951.

SOURCE: Actual figures: *Census of Canada 1931-51*.

Estimates: D.B.S.

Table 6

PROFESSIONAL WORKERS IN CANADIAN LABOUR FORCE, 1931-51

Number of workers		Professional occupations, 1951 Census	Number of workers	
1931	1941 ^a		A 1951	B
17,623	25,887 ^b	Accountants and auditors	34,151	
79 ^c	164 ^c	Actuaries	258	
899	1,375 ^c	Agricultural professionals, n.e.c.	2,698	
1,298	1,313	Architects	1,740	
2,618	3,492	Artists and art teachers	4,896	
3,344	4,580	Authors, editors, journalists	7,217	
		Brothers and nuns, n.e.c.		12,008
3,318	8,203	Chemists and metallurgists	8,574	
12,678	14,474	Clergymen and priests	16,097	
4,039	4,210	Dentists	4,608	
491 ^c	935 ^c	Dieticians	1,101	
		Draughtsmen and designers		13,012
7,524	7,470	Engineers, civil (incl. surveyors)	12,168	
3,937	5,118	Engineers, electrical	6,349	
2,859	4,870	Engineers, mechanical	8,328	
1,498	3,043	Engineers, mining and chemical	4,616	
544	481	Judges and magistrates	597	
		Laboratory technicians, n.e.c.		14,313
8,058	8,621	Lawyers and notaries	9,038	
1,009	1,578	Librarians	2,061	
8,786	8,461	Musicians and music teachers	8,033	
20,462	27,114	Nurses, graduate	35,138	
		Nurses-in-training		15,623
542	585	Osteopaths and chiropractors	832	
		Photographers		3,598
10,020	11,873	Physicians and surgeons	14,325	
3,200	4,217	Professors and college principals	5,422	
		Religious workers, n.e.c.		2,437
892 ^c	1,460 ^c	Social welfare workers, n.e.s.	3,995	
138 ^c	327 ^c	Statisticians	742	
82,983	88,279	Teachers (incl. instructors)	105,118	
1,046	1,095	Veterinarians	1,205	
777 ^d	1,177 ^d	Other	3,250 ^d	13,132 ^d
200,662	240,402	Total professional, Report definition	302,557	302,557
		Total professional, 1951 Census definition		376,680

Column A contains the 1951 totals for occupations regarded as professional for the purposes of this report. Column B contains data on occupations classified as professional in the 1951 Census, but not coming within the definition of professional occupations used in this report. All figures exclude Yukon and Northwest Territories, and the 1931 and 1941 figures also exclude Newfoundland.

a Includes persons on Active Service.

b Interpolation.

c Estimate.

d Estimates. The figure shown in column A includes mainly social scientists other than actuaries and statisticians, geologists and other scientists n.e.s., optometrists and fish culturists. In the 1951 Census these occupations were classified in "Other professional occupations" together with a number of occupations which do not come within the definition of professional occupations used in this report. The balance of this group, not regarded here as professional, is entered in column B. The figures shown for 1931 and 1941 are comparable totals for the same group of professionals as shown in column A.

SOURCE: Actual figures: *Census of Canada, 1931-51*.

Estimates: D.B.S.

Table 7

CIVILIAN LABOUR FORCE, PROFESSIONAL WORKERS AND SKILLED WORKERS, CANADA,
AT JUNE, SELECTED YEARS, 1931-56

(thousands)

Year	Civilian non-institutional population 14 years of age and over	Civilian labour force	Labour force as % of population	Professional workers	Professional as % of labour force	Skilled workers	Skilled as % of labour force
1931.....	7,116	4,151	58.3	201	4.8	456	11.0
1941.....	8,352 ^a	4,762 ^a	57.0	240 ^a	5.0	587 ^a	12.3
1946.....	8,768	4,862	55.5	263 ^b	5.4 ^b	661 ^b	13.6 ^b
1951.....	9,696	5,236	54.0	303	5.8	787	15.0
1956.....	10,699	5,764	53.9	357 ^c	6.2 ^c	940 ^c	16.3 ^c

Figures exclude Yukon and Northwest Territories, but include Newfoundland in 1951 and 1956.

^a Including persons on Active Service.

^b Interpolation.

^c Projections.

SOURCE: Labour Force Estimates, D.B.S., and Tables 5 and 6.

Table 7 shows that these specialized manpower resources have constituted a growing proportion of the Canadian labour force as the economy has developed and matured. In 1931, skilled workers amounted to 11.0% of the labour force, compared with 15.0% 20 years later. During the same period, the percentage of professional workers increased from 4.8% to 5.8%. A projection of the growth trend of the years 1941-51 brings the proportion of skilled workers to 16.3% and of professional workers to 6.2% of the labour force in 1956. This suggests that in the first 10 postwar years alone, the number of professional workers in Canada increased by about 94,000 and that of skilled workers by nearly 280,000. The economy's gross requirements for specialized manpower during this period must, of course, have been much greater than these figures because of the need to replace workers who retire, die or emigrate.

The remainder of this chapter assesses, as far as possible, the contribution that each of the three basic sources—formal training, immigration, on-the-job training—made to Canada's supply of skilled and professional manpower in the postwar decade.

Formal Training

Professional Workers

Although not all professional workers are college graduates and not all college graduates enter professional occupations, colleges and universities are a major and vital source of Canada's professional manpower. Since the end of World War II the total undergraduate enrolment in Canadian colleges, universities and professional schools has varied within a fairly wide range, largely as a result of heavy veteran enrolment in the early postwar years. In addition, however, the proportion of college-age population attending colleges and universities has been increasing.

College and university enrolment

Total undergraduate enrolment in Canadian colleges and universities rose quickly from some 62,000 in the first postwar academic year to a peak of nearly 80,000 in 1947-48, and then dropped to a postwar low of less than 60,000 in 1951-52. In 1953 undergraduate enrolment once again began to rise and reached 68,000 in 1955-56.

In the first four postwar years, during which college and university enrolment reached the highest figure on record, between 28% and 45% of all full-time undergraduate students were war veterans. The decline of veteran enrolment to insignificant proportions was almost entirely responsible for the downward trend of total enrolment which began in 1949 and was not reversed until 1953. This is illustrated in Table 8, which also shows that without the great influx of veterans into colleges and universities in the early

Table 8
COLLEGE-AGE POPULATION AND FULL-TIME UNDERGRADUATE ENROLMENT IN UNIVERSITIES AND COLLEGES, CANADA, 1946-56^a

Academic year	College-age population (18-21 years) ^b	Total full-time undergraduate enrolment	Veteran full-time undergraduate enrolment	Full-Time undergraduate enrolment less veterans	Full-Time undergraduate non-veteran enrolment as % of college-age population
1945-46.....	867,000	61,861	20,000	41,861	4.8
1946-47.....	865,240	76,237	34,000	42,237	4.9
1947-48.....	860,760	79,346	29,600	49,746	5.8
1948-49.....	880,120	75,807	21,800	54,007	6.1
1949-50.....	872,320	69,111	13,049	56,062	6.4
1950-51.....	856,880	64,036	6,126	57,910	6.8
1951-52.....	867,400	59,849	2,464	57,385	6.6
1952-53.....	871,800	60,046	1,125	58,921	6.8
1953-54.....	883,640	61,179	533	60,646	6.9
1954-55.....	894,440	64,300 ^c	322	63,978	7.2
1955-56.....	906,640	68,300 ^c	202	68,098	7.5

^a Excludes Normal School students and nurses studying for R.N.

^b Forty per cent of those 15 to 24 years of age on June 1 at the end of each academic year.

^c Preliminary.

Source: Compiled by Economics and Research Branch of the Dept. of Labour from information supplied by D.B.S.

postwar years, undergraduate enrolments would have shown an almost consistent uptrend, although the number of young men and women in the college-age group (18 to 21 years) remained relatively constant throughout the greater part of the postwar decade.

This means that, veterans apart, there was a gradual increase in the proportion of the 18- to 21-year-olds going to college. From 1946 to 1956, this proportion increased by 2.7 percentage points to 7.5%, assuming that all non-veteran undergraduates were in the 18 to 21 age bracket. This assumption does not hold true for some undergraduates, particularly those in law and medicine, but the resulting bias is not particularly significant if the actual ratios are used only for comparison over a period of time. Such a comparison makes it fairly plain that increasing participation was the major factor accounting for the growth of non-veteran enrolment in colleges and universities over the postwar period.

College and university graduations

Annual totals of graduations tend to follow changes in enrolments with a lag of two or more years. Graduations reached a high point of 18,081 in 1950, after a peak in enrolments in 1948. In the last three years of the postwar decade graduations were below 13,000, following a trough in enrolments in 1952-54. They are expected to rise again from 1956 onward following the uptrend in enrolments in recent years.

Total graduations over the postwar decade amounted to some 134,000. In the first five years, 1946 to 1950, graduations totalled more than 67,000, and in the second five years they were only slightly below this figure. Graduations, therefore, were approximately equal in the two five-year periods, with veteran graduations playing a significant role in the first period and increasing participation compensating for most of the reduction in veteran graduations in the second half of the decade.

Engineering enrolment and graduations

Much of the concern over the shortage of professional personnel in the postwar period has focused on engineers. The factors bearing on the total number of graduations during the postwar decade also affected the volume of graduations in engineering and applied science. As shown in Table 9, graduations of engineers more than tripled from 1,000 in 1946 to a peak of 3,600 in 1950. Thereafter, they declined to less than 1,300 in 1954 rising only slightly in the following year. Over the entire decade, more than 18,000 engineers graduated from Canadian colleges and universities, 10,400 graduating in the first five years and about 8,000 in the second five.

Veteran enrolments affected the level of engineering graduations to a greater extent than they did total graduations. Veterans were a predomi-

nantly male group and tended to enter vocationally oriented courses in proportionately greater numbers than the student body as a whole. There is also some evidence that wastage rates were lower for veterans than for university students generally, although the rates among engineering students tend to be higher than for students in other courses.

Table 9

FIRST DEGREES CONFERRED BY UNIVERSITIES AND COLLEGES IN CANADA, 1946-55

Year	All degrees	Engineering degrees
1946.....	8,122	1,006
1947.....	9,830	1,096
1948.....	13,733	1,690
1949.....	17,883	2,999
1950.....	18,081	3,598
1951.....	15,654	2,427
1952.....	13,288	1,770
1953.....	12,575	1,337
1954.....	12,600	1,252
1955.....	12,500 ^a	1,337 ^a

^a Preliminary.

SOURCE: Education Division, D.B.S.

Table 10

TOTAL UNDERGRADUATE AND ENGINEERING UNDERGRADUATE ENROLMENT IN UNIVERSITIES AND COLLEGES, CANADA, 1935-56

Year	Total full-time undergraduate enrolment	Full-time undergraduate engineering enrolment	Engineering enrolment as % of total enrolment
1934-35.....	33,051	3,312	10.0
1935-36.....	33,522	3,387	10.1
1936-37.....	33,918	3,646	10.7
1937-38.....	34,460	4,033	11.7
1938-39.....	35,164	4,281	12.2
1939-40.....	35,903	4,445	12.4
1940-41.....	34,817	4,381	12.6
1941-42.....	34,680	4,482	12.9
1942-43.....	35,692	5,434	15.2
1943-44.....	35,132	4,948	14.1
1944-45.....	38,376	5,302	13.8
1945-46.....	61,861	10,884	17.6
1946-47.....	76,237	13,609	17.9
1947-48.....	79,346	14,373	18.1
1948-49.....	75,807	12,874	17.0
1949-50.....	69,111	10,595	15.3
1950-51.....	64,036	8,367	13.1
1951-52.....	59,849	7,468	12.5
1952-53.....	60,046	7,823	13.0
1953-54.....	61,179	8,789	14.4
1954-55.....	64,300 ^a	10,498	16.3
1955-56.....	68,300 ^a	11,702	17.1

^a Preliminary.

SOURCE: Compiled by Economics and Research Branch of the Dept. of Labour from information supplied by D.B.S.

Table 10 shows the proportion of engineering enrolments to total university enrolments since 1935. These data indicate that during the period of heavy veteran participation the proportion of engineering enrolments increased markedly above earlier levels and dropped again after 1951, when most veterans had graduated. It is interesting to note, however, that the proportion of students entering engineering has increased sharply in recent years, presumably as a result of the extremely strong demand for graduate engineers. These increases raised the proportion of engineering enrolments in 1955 and 1956 almost to the levels characteristic of the peak period of veteran training.

In summary, the graduation of engineers in the postwar decade was influenced by the increasing proportion of the college-age group attending university, by the comparatively higher enrolment of veterans in engineering than in other courses, and, in more recent years, by an increasing proportion of students entering engineering courses. The trough in engineering graduations was apparently reached in 1954. Such graduations should increase relatively more rapidly than total graduations during the next few years as a result of the increasing proportion of students entering engineering.

Skilled workers

Statistical information on the formal training of skilled workers is limited on the whole to the more firmly established training programmes. It was indicated above that the formal training of youth through apprenticeship and in other ways is only one means by which skilled workers acquire their skills. On-the-job experience and upgrading to skilled status within industry is an important source of many kinds of skilled workers. Thus it cannot be concluded that any gap between the supply of skilled workers provided by formal training and total requirements is filled by immigration, but rather that the requirements are met by a combination of formal training, immigration and on-the-job experience.

The number of different systems of apprenticeship in Canada makes it difficult to piece together the over-all picture. Nevertheless, the data which can be assembled from various sources on training through apprenticeship are probably more comprehensive than the statistics on other forms of vocational training. Some information is available on the numbers taking vocational and technical courses in public institutions, but there are no over-all figures on the training of skilled tradesmen and technicians by private schools or by private correspondence courses.

Apprenticeship training

At March 31, 1956, some 15,000 persons were registered as apprentices with provincial agencies in the eight Canadian provinces that had signed

apprenticeship training agreements with the federal government. This figure, however, does not cover the full scope of apprenticeship training in Canada, not only because it omits two provinces—Prince Edward Island and Quebec—but also because it refers by and large only to designated trades, *i.e.*, trades in which apprenticeship is regulated by provincial legislation.

A large number of apprentices are receiving training in non-designated trades, and thus are not subject to registration with provincial authorities. Furthermore, practices respecting registration of apprentices vary from province to province, as does the number of designated trades.

The varying scope of provincial registration is not, however, very significant in the building trades, particularly since most of them are designated trades in all eight provinces that participate in the federal-provincial training programme. It is possible, therefore, to regard the number of apprentices registered in these trades as a reasonably adequate count of apprentices in construction in the eight provinces. As shown in Table 11, the number of apprentices so registered was close to 8,000 at March 31, 1956. In Quebec, the only other province with a large volume of trade training, the concept of apprenticeship differs substantially from that in other provinces. An indenture or apprenticeship contract is not required in Quebec of either employer or apprentice. Thus young people in Quebec find it relatively easy to enter apprenticeship, and the number of them who do so cannot be compared accurately with the number of apprentices in other parts of Canada. Class instruction is another factor making exact comparison difficult. In Quebec enrolment in training courses, though encouraged, is not necessarily an integral part of apprenticeship training as in other provinces. The greater flexibility of the Quebec system also involves certain regional differences in standards and training procedures since the conditions of apprenticeship are largely determined on a local or district basis by the appropriate Parity Committees. In 1956 Parity Committees in the construction industry reported approximately 16,700 apprentices.

The extent of apprenticeship training in the non-building trades can be determined in broad terms from a combination of provincial registrations and data from other sources. The number of apprentices in the automotive trades in Canada, excluding Quebec, may be gauged fairly accurately from provincial registrations, which reached 5,100 at March 31, 1956. Included in this total are 4,634 motor vehicle mechanic apprentices and 466 apprentices in auto body repair. In the same year, the existing Parity Committees in the garage trade in the province of Quebec (Montreal, Quebec, Sherbrooke, Megantic, Rimouski) reported 1,657 apprentices.

Most other trades in which apprenticeship takes the form of gradual progression to journeyman's status are associated with manufacturing indus-

tries. The number of apprentices in factory trades who are registered with provincial agencies is not very large, as in most provinces few of these trades are designated for apprenticeship purposes. A more complete picture of the extent of apprenticeship training in manufacturing can be gained from the surveys of employers conducted by the Canadian Department of Labour. These surveys, which cover most of all but the smallest establishments, indicate that by 1956 the number of apprentices in manufacturing exceeded 9,000.

Apprenticeship in the building trades

Table 11 contains data on apprentices in the building trades in the eight provinces in which apprentices following an organized training programme register with provincial agencies. As Table 11 shows, the number of apprentices so registered reached a high point of 6,308 in 1948, mainly as a result of heavy veteran participation. During the next two years registrations dropped by nearly 1,000. From 1951 to 1953 the number of apprentices in the building trades in Canada, excluding Prince Edward Island and Quebec, remained below the 6,000 mark. In 1954 the total reached a new postwar high of 6,554 and continued to climb to 7,755 in 1956. Although most building trades shared in the increase, the greatest rise was in the electrical, plumbing and steamfitting trades. Between 1947 and 1956 the number of apprentices in these trades rose by nearly 80%. The introduction of regulations making it compulsory for tradesmen in these trades in certain areas to hold a certificate of proficiency or completion of apprenticeship undoubtedly contributed to this large gain.

The relative importance of organized apprenticeship training in the construction industry can be gauged from a comparison of the number of paid workers in construction with the number of registered apprentices in the building trades. The value of such a comparison as a measure of the extent of training in relation to the entire working force in the industry in any given year is limited, since the paid workers group excludes persons who work in construction on their own account or as employers; these account for some 19% of the labour force in the construction industry. The paid workers group, moreover, excludes building tradesmen who at one time served their apprenticeship in the construction industry and later took up maintenance work in other industries. Likewise, some of the building trades apprentices are probably lost to other industries when they become skilled tradesmen. These divergences make it difficult to determine the significance of the ratio of apprentices to the paid workers in the industry in any given year, but the comparison nevertheless remains useful as a measure of the year-to-year changes over a period of time.

Table 11

REGISTERED APPRENTICES IN THE BUILDING TRADES, BY TRADE, EIGHT PROVINCES, 1947-56^a

Trade	Number of apprentices registered at March 31										
	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	
Bricklayers and stone masons ^b	463	682	477	351	370	353	338	396	397	442	
Carpenters.....	1,302	1,550	1,226	908	1,048	959	947	1,016	1,070	1,329	
Electricians.....	1,212	1,328	1,269	1,324	1,435	1,449	1,637	1,940	2,084	2,149	
Painters and decorators.....	323	261	197	157	186	151	163	193	205	260	
Plasterers.....	182	263	233	399	255	271	228	230	263	287	
Plumbers and pipefitters ^c	1,297 ^e	1,586 ^e	1,419	1,402	1,452	1,411	1,461	1,582	1,740	1,884	
Sheet metal workers.....	564	616	576	569	624	623	633	748	850	897	
Steamfitters.....	f	f	296	262	235	247	328	403	402	432	
Other building trades ^d	21	22	9	23	15	17	31	46	53	75	
Total.....	5,364	6,308	5,702	5,395	5,620	5,481	5,766	6,554	7,064	7,755	

^a Excludes Prince Edward Island and Quebec; includes Newfoundland from 1954.

^b Includes plasterers in New Brunswick.

^c Includes steamfitters in British Columbia.

^d Lathers and tile setters.

^e Includes steamfitters.

^f Included with plumbers.

Source: Canadian Vocational Training Branch, Dept. of Labour.

The two sets of data are shown in Table 12 for the eight provinces from which apprenticeship figures are available on a comparable basis. During the postwar period, organized training in the building trades has not kept pace with the expansion of employment in construction. In 1947 the number of apprentices in the building trades equalled 4.4% of paid workers in the industry. Three years later the ratio dropped to 3.1%, and for the remainder of the postwar period remained well below the 1947 level, despite the rise in apprentice registrations in the last four or five years. This suggests that, since the end of the war, organized training has lost some of its weight as a source of skilled manpower for the construction industry.

Table 12

**REGISTERED APPRENTICES IN THE BUILDING TRADES AND
TOTAL PAID WORKERS IN THE CONSTRUCTION INDUSTRY,
EIGHT PROVINCES, 1947-56^a**

Year	Paid workers in construction at survey date closest to June 1	Registered apprentices in the building trades at March 31	Ratio of apprentices to paid workers (%)
1947.....	123,000	5,364	4.4
1948.....	153,000	6,308	4.1
1949.....	178,000	5,702	3.2
1950.....	175,000	5,395	3.1
1951.....	171,000	5,620	3.3
1952.....	170,000	5,481	3.2
1953.....	185,000	5,766	3.1
1954.....	200,000	6,554	3.3
1955.....	204,000	7,064	3.5
1956.....	239,000	7,755	3.2

^a Excludes Prince Edward Island and Quebec; includes Newfoundland from 1954.

SOURCE: Special Surveys Division, D.B.S., and Canadian Vocational Training Branch, Dept. of Labour.

While apprentice registrations are useful in assessing the extent of organized trade training, they give no indication as to how many apprentices have emerged as fully qualified journeymen. Over the last 10 years the proportion of apprentices who have not completed their training has been quite large on the whole, but the ratio has varied from trade to trade. This is illustrated in Table 13 which shows the cumulative totals of registrations, completions and dropouts in the building trades from April 1, 1946 to March 31, 1956. Of every 100 apprentices who passed out of the training programme during this period, 62 qualified as journeymen and 38 dropped out without completing their formal training. In some trades, notably bricklaying and plastering, the proportion of completions was markedly higher than the average for the building trades as a group. Apprentices in bricklaying, for instance, showed 71 completions for every 29 cancellations. In the painting and decorating trades, on the other hand, only about one-half of the apprentices who entered apprenticeship training qualified as journeymen. The fairly large

proportion of dropouts, however, does not represent a total waste of training resources, since many apprentices who drop out before completing their training continue to work in the industry and acquire proficiency as qualified tradesmen through on-the-job experience.

Between 1946 and 1956 more than 12,000 apprentices in the building trades in Canada, excluding Prince Edward Island and Quebec, became fully qualified journeymen, and another 7,000 took some formal training but dropped out before reaching journeyman status.

Apprenticeship in manufacturing

In manufacturing, the printing and publishing industry leads all other branches of manufacturing in apprenticeship training. In 1956 nearly 10% of plant workers in printing and publishing were apprentices, and apprenticeship training programmes were established in three out of every four printing and publishing firms. These figures are based on the results of the 1956 survey of working conditions conducted by the Canadian Department of Labour. This survey provides a more complete coverage than provincial registrations of apprentices in the manufacturing trades, as the number of apprentices in these trades who register with provincial agencies is not very large.

As shown in Table 14 manufacturing establishments covered by the working conditions survey reported 9,047 apprentices at April 1, 1956. Two industries—printing and publishing, and iron and steel products—accounted for more than 45% of this total. The remainder was distributed in varying numbers among the 15 other major industry groups in manufacturing.

Table 14 also measures the extent of apprenticeship training in the various manufacturing industries in terms of the proportion of apprentices to plant employees. In 1956, this ratio amounted to 9.2% in printing and publishing; in the rest of manufacturing it was generally much lower, ranging from 1.6% in the leather goods industry to less than 0.1% in rubber products.

The volume of apprenticeship training varies widely from one manufacturing industry to another. Although some training is undertaken in each of the major industry groups, the percentage of firms having apprenticeship training programmes in 1956 varied from a low of 6% in the petroleum industry to a high of 75% in printing and publishing. The second highest-ranking industry, iron and steel products, reported apprenticeship training in 36% of all establishments, and only three other industry groups reported more than 20% of establishments with such training. Thus in most industries only a small proportion of firms was bearing the cost of training apprentices.

Table 13

REGISTERED APPRENTICES IN THE BUILDING TRADES, EIGHT PROVINCES^a
CUMULATIVE TOTALS OF REGISTRATIONS, COMPLETIONS AND DROPOUTS,
APRIL 1, 1946 - MARCH 31, 1956

Trade	(1) Registrations	(2) Completions	(3) Dropouts	(4) Apprentices registered at March 31, 1956	(5) Col. (1) less Col. (4)	(6) Completions as % of Col. (5)
Bricklayers and stone masons ^b	1,975	1,091	442	442	1,533	71
Carpenters.....	5,906	2,648	1,929	1,329	4,577	58
Electricians.....	7,243	3,280	1,814	2,149	5,094	64
Painters and decorators.....	1,244	504	480	260	984	51
Plasterers.....	1,149	578	284	287	862	67
Plumbers and pipefitters.....	6,080	2,735	1,461	1,884	4,196	65
Sheet metal workers.....	3,082	1,241	944	897	2,185	57
Steamfitters.....	1,284	543	309	432	852	64
Total.....	27,963	12,620	7,663	7,680	20,283	62

^a Excludes Prince Edward Island and Quebec; includes Newfoundland from 1954.

^b Includes plasterers in New Brunswick.

^c Includes steamfitters in British Columbia.

SOURCE: Canadian Vocational Training Branch, Dept. of Labour.

Table 14
EXTENT OF APPRENTICESHIP TRAINING IN MANUFACTURING, CANADA, APRIL 1, 1956

	Establishments			Non-office employees		
	Number of establishments covered	Number reporting apprenticeship training	% reporting apprenticeship training	Number of non-office employees	Number of apprentices	% of apprentices among non-office employees
Manufacturing industry						
Foods and beverages.....	1,020	83	8	87,845	375	0.4
Tobacco and tobacco products.....	24	3	13	7,430	28	0.4
Rubber products.....	31	4	13	14,502	11	0.1
Leather products.....	188	34	18	17,538	288	1.6
Textile products.....	253	34	13	49,623	175	0.4
Clothing.....	602	102	17	53,447	813	1.5
Wood products.....	747	88	12	59,190	481	0.8
Paper products.....	278	73	26	67,110	722	1.1
Printing, publishing and allied industries.....	445	334	75	27,894	2,560	9.2
Iron and steel products.....	816	291	36	131,580	1,586	1.2
Transportation equipment.....	201	61	30	93,790	797	0.8
Non-ferrous metal products.....	179	38	21	40,644	349	0.9
Electrical apparatus and supplies.....	182	36	20	51,356	295	0.6
Non-metallic mineral products.....	212	28	13	19,476	139	0.7
Products of petroleum and coal.....	62	4	6	9,631	41	0.4
Chemical products.....	302	20	7	27,200	161	0.6
Miscellaneous manufacturing.....	205	26	13	14,949	226	1.5
Manufacturing total.....	5,747	1,259	22	773,205	9,047	1.2

^a Excludes auto repair and garages.

Source: Economics and Research Branch, Dept. of Labour.

For manufacturing as a whole, apprenticeship does not bulk very large as a source of skilled factory labour, but available data suggest that the volume of apprenticeship training has increased in recent years. The upward trend is illustrated in Table 15 which shows that between 1953 and 1956 the proportion of manufacturing establishments with apprenticeship training increased from 16.6% to nearly 22%. At the same time, not only did the number of apprentices rise by more than 2,000, but the ratio of apprentices to non-office workers increased from 1 in 40 in 1953 to 1 in 33 in 1956.

Table 15

EXTENT OF APPRENTICESHIP TRAINING IN MANUFACTURING^a, 1953-56

Year (at April 1)	Proportion of establishments reporting apprenticeship training (%)	Number of apprentices	Number of non-office employees in establishments reporting apprenticeship training	Ratio of apprentices to non-office employees
1953.....	16.6	6,554	264,232	1 : 40
1954.....	16.4	6,853	248,824	1 : 36
1956.....	21.9	9,047	295,322	1 : 33

^a Excludes auto repair and garages.

SOURCE: Economics and Research Branch, Dept. of Labour.

Other types of organized training

Not all organized training of skilled workers is through apprenticeship whereby a person advances by progressive stages to journeyman status. Other types of training, which for want of a better term might be described as non-apprenticeship training, do not as a rule have the clearly defined training sequence that is characteristic of apprenticeship and may, in some cases, be of shorter duration.

The somewhat less formal nature of non-apprenticeship training compounds the difficulties which normally lead to gaps in statistical coverage. It is largely for this reason that the existing data on non-apprenticeship are not adequate for an assessment of the over-all extent of such training. Sufficient information is available from manufacturing establishments, however, to place into perspective the extent of non-apprenticeship training in manufacturing. In 1956, manufacturing establishments with apprenticeship training outnumbered those with other types of organized training programmes by at least three to one. Some establishments, of course, report both apprenticeship and other training. The ratio of apprentices to the other trainees, however, was much narrower—17 apprentices to every 10 trainees.

As shown in Table 16, the paper products industry and the iron and steel products industry each accounted for more than 1,000 of the 5,369

trainees reported by establishments in the manufacturing sector. In the paper products industry the number of trainees was actually greater than that of apprentices. The same is true of five other manufacturing industries, but in most of these the numbers of both trainees and apprentices were comparatively small.

Table 16

COMPARISON OF APPRENTICESHIP AND OTHER ORGANIZED TRAINING IN MANUFACTURING, CANADA, APRIL 1, 1956

Manufacturing industry	Apprenticeship		Other organized training		Ratio of trainees to apprentices
	Estab-lish-ments	Appren-tices	Estab-lish-ments	Trainees	
Foods and beverages.....	83	375	35	493	1:0.8
Tobacco and tobacco products...	3	28	1	6	1:4.7
Rubber products.....	4	11	3	28	1:0.4
Leather products.....	34	288	6	71	1:4.1
Textile products.....	34	175	27	379	1:0.5
Clothing.....	102	813	22	279	1:2.9
Wood products.....	88	481	29	150	1:3.2
Paper products.....	73	722	43	1,060	1:0.7
Printing, publishing, and allied industries.....	334	2,560	45	217	1:11.8
Iron and steel products.....	291	1,586	86	1,050	1:1.5
Transportation equipment ^a	61	797	20	623	1:1.3
Non-ferrous metal products.....	38	349	17	111	1:3.1
Electrical apparatus and supplies...	36	295	13	227	1:1.3
Non-metallic mineral products...	28	139	12	101	1:1.4
Products of petroleum and coal...	4	41	11	178	1:0.2
Chemical products.....	20	161	11	172	1:0.9
Miscellaneous manufacturing.....	26	226	11	224	1:1.0
Manufacturing total.....	1,259	9,047	392	5,369	1:1.7

^a Excludes auto repair and garages.

SOURCE: Economics and Research Branch, Dept. of Labour.

The ratio of trainees to apprentices was highest in the petroleum industry where there were five trainees for every apprentice. This was also the only industry with fewer apprenticeship programmes than other types of organized training. At the other end of the scale, in printing and publishing, seven times as many establishments reported apprenticeship programmes as other types of organized trade training, with apprentices outnumbering trainees by nearly 12 to 1.

Enrolment in vocational schools

Vocational schools do not graduate fully qualified tradesmen for industry. Their graduates, however, do acquire knowledge and skills which are useful to them when they enter employment and either go into industrial apprenticeship programmes or acquire additional experience through on-the-job training and upgrading. Of the statistical information in Table 17, the

Table 17

ENROLMENT IN VOCATIONAL CLASSES, NINE PROVINCES, 1947-55^a

Course	1947-48		1951-52		1954-55	
	Day classes	Evening or part-time	Day classes	Evening or part-time	Day classes	Evening or part-time ^b
Agriculture.....	643	71	5193	—	1,080	249
Commercial.....	17,617	12,548	22,566	16,003	40,462	19,675
Commercial art.....	—	—	1,188	1,427	835	1,097
Industrial.....	19,147	26,374	19,993	38,449	26,739	53,456
Home economics.....	3,741	13,142	4,770	17,511	3,578	13,948
Service occupations.....	40	—	302	665	290	2,637
Total.....	41,188	52,135	54,012	74,055	72,984	91,062

^a Enrolments in vocational classes in publicly owned vocational, technical or composite high schools, technical institutes and trade schools in Canada excluding the province of Quebec. Apart from private school enrolments, the table excludes apprenticeship training programmes, special and short courses, correspondence courses, and enrolments in courses which cannot be classified to any of the six major subject groups.

^b Complete enrolments not available for 1954-55. Figures shown are for 1953-54.

SOURCE: Canadian Vocational Training Branch, Dept. of Labour.

data most relevant to the pre-employment training of skilled tradesmen are those on enrolment in daytime industrial courses. The much larger evening enrolments include students taking short courses for one or two evenings a week, students who are taking courses on a hobby or casual basis, as well as a number of students who are already employed and seek to improve their vocational qualifications. Like most other statistics on trade training, the figures are not complete. They exclude Quebec, and in the other nine provinces cover only publicly owned institutions. However, enrolment in vocational classes in publicly owned schools and institutes accounts for the bulk of vocational class instruction in the nine provinces.

As shown in Table 17, daytime enrolment in industrial classes remained relatively stable at about 19,000 from 1947 to 1952, and in the next three years climbed toward the 27,000 mark. Although this increase did not match the 80% jump in enrolments in commercial courses, it was nevertheless somewhat greater than the rate of growth of the trainable age group during the same period. It seems, therefore, that the increase in enrolments in daytime industrial courses between 1952 and 1955 was due in part to a greater participation of the 15- to 19-year-olds in this type of trade training. This trend in industrial pre-employment training paralleled to some extent the trend of secondary school enrolments generally.

Immigration

Immigration to Canada in the first postwar decade can conveniently be divided into two periods, 1946-50 and 1951-55. From 1946 to 1950 total immigration amounted to 430,389 and averaged about 86,000 a year. From 1951 to 1955 immigration totalled 791,930, averaging approximately 158,000 per year.

The variables affecting the flow of immigrants to Canada were considerably different in the two five-year periods. In the first period, they were essentially related to the difficulties of overseas transportation, the relatively heavy reliance on sponsored immigration, and restrictions on the admission of former enemy aliens. An important additional factor, particularly in this first period, was the passing of orders-in-council permitting the admission to Canada of displaced persons. Immigration of displaced persons began on a small scale in 1947, reaching a peak of 47,388 in 1948. The flow of displaced persons then remained fairly high until 1951, and decreased quickly thereafter. The total movement of displaced persons in the years 1947-52 amounted to approximately 166,000 persons.

The increase in the volume of immigration in the second five-year period becomes even more evident if immigration of displaced persons is considered outside the general movement. As shown in Table 18, the volume of immigration to Canada, apart from displaced persons, averaged only

63,000 per year during the first five-year period, while in the next five years the average annual rate, at 148,000, was more than twice as high.

The main factor responsible for this sharp rise in immigration in the second period was the liberalization of Canadian immigration policy in mid-1950. This consisted largely of permitting a considerable volume of unsponsored immigration, varying with economic conditions in Canada. In effect this meant an occupational selection of unsponsored immigrants in the light of domestic labour market conditions, citizens of the United Kingdom and certain other British subjects, and citizens of France and of the United States excepted. In these latter cases, however, persons in occupations in surplus supply in Canada were not encouraged to enter if they wished to seek work in their chosen occupation.

Table 18

IMMIGRATION TO CANADA, 1946-55

Year	Total	D.P.'s	Total excluding D.P.'s
1946.....	71,719	—	71,719
1947.....	64,127	7,345	56,782
1948.....	125,414	47,388	78,026
1949.....	95,217	37,800	57,417
1950.....	73,912	22,906	51,006
1951.....	194,391	42,248	152,143
1952.....	164,498	8,010	156,488
1953.....	168,868	—	168,868
1954.....	154,227	—	154,227
1955.....	109,946	—	109,946
<i>1946-50:</i>			
Total.....	430,389	115,439	314,950
Average.....	86,078	—	62,990
<i>1951-55:</i>			
Total.....	791,930	50,258	741,672
Average.....	158,386	—	148,334
<i>1946-55:</i>			
Total.....	1,222,319	165,697	1,056,622
Average.....	122,232	—	105,662

SOURCE: Compiled by Economics and Research Branch of the Dept. of Labour from information supplied by the Dept. of Citizenship and Immigration.

Except in 1946, when a large part of immigration to Canada consisted of dependents from the United Kingdom of Canadian ex-servicemen the proportion of immigrants who were destined to the labour force has remained relatively constant, varying between 57.1% in 1948 and 51.4% in 1950.

Although from 1947 on the over-all percentage of workers among immigrants has remained relatively constant, averaging some 54.0% of total immigration, the proportion of skilled and professional workers in the working group as a whole has varied considerably. The number of specialized

workers entering Canada each year has depended not only on the variables that caused changes in total immigration over the two periods, but also on the sources of immigrant workers and the types of workers coming from these sources.

Immigration 1946-50

From 1946 to 1950 an estimated 10,700 professional workers,⁴ an average of 2,146 per year, entered Canada as immigrants. During the same period the number of skilled workers, excluding miners, entering Canada as immigrants totalled 35,019, averaging 7,004 per year.

In the last three years of this period the proportion of professionals among immigrant workers destined to the non-farm labour force averaged only 6.8%, compared to 10.7% from 1951 to 1955. It should be borne in mind, however, that in the early postwar years, particularly from 1948 on, a good deal of emphasis was placed on the movement of immigrant workers to agriculture and other primary industries. As shown in Table 19, the proportion of immigrant workers destined to the farm labour force jumped from 12.9% in 1947 to 27.6% in 1948 and reached a peak of 40.9% in 1950. Some of these workers no doubt had professional qualifications and moved into professional work within a few years after they arrived in Canada. To this extent, the number of professionals shown in the immigration statistics for these years is likely to be understated.

Immigration 1951-55

After 1951 the somewhat unique factors associated with the aftermath of World War II had largely run their course and Canadian immigration policy was more or less stabilized in terms of longer-run considerations. The proportion of professional workers among immigrants destined to the non-farm labour force increased from 5.7% in 1951 to 14.0% in 1955. The relatively low percentage for 1951 is due in part to the large number of displaced persons, very few of whom were in professional occupations, and in part also to an unusually low proportion of British immigrants who have always had a large number of professionals among them.

The percentage of professional workers increased after 1951, partly because the proportion of British immigrants increased and partly because the number of displaced persons among immigrants was reduced to very small proportions. Similarly, the declining percentage of agricultural workers had the effect of building up the proportion of professional workers to the total. The percentage of professional workers in total immigration increased from 2.5% in 1951 to 6.5% in 1955.

⁴This figure and all subsequent figures on professional workers among immigrants are based on the Census of Canada concept of professional occupations which is broader than that used in this Report to compile figures on professionals in Canada (see Table 6).

Table 19

IMMIGRANTS TO CANADA, BY SELECTED OCCUPATIONAL CHARACTERISTICS, 1946-55^a

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
(A) All immigrants.....	71,719	64,127	125,414	95,217	73,912	194,391	164,498	168,868	154,227	109,946
(B) Destined to labour force.....	11,852	35,219	71,636	50,285	37,988	110,522	85,029	91,133	84,376	57,987
% of (A).....	16.5	54.9	57.1	52.8	51.4	56.8	51.7	54.0	54.7	52.8
(C) Destined to farm l.f.....	1,120	4,550	19,799	19,139	15,520	25,890	16,971	17,250	10,920	7,036
% of (B).....	9.4	12.9	27.6	38.1	40.9	23.4	19.9	19.0	13.0	12.1
(D) Destined to non-farm l.f.....	10,732	30,669	51,837	31,146	22,468	84,632	68,058	73,883	73,456	50,951
% of (B).....	90.6	87.1	72.4	61.9	59.1	76.6	80.1	81.0	87.0	87.9
(E) Professional ^b	1,429	2,414	2,970	2,118	1,801	4,850	7,329	8,588	8,350	7,159
% of (A).....	2.0	3.8	2.4	2.2	2.4	2.5	4.5	5.1	5.4	6.5
% of (B).....	13.3	7.9	5.7	6.8	8.0	5.7	10.8	11.6	11.4	14.0
(F) Skilled ^c	2,172	6,983	12,995	7,763	5,106	27,726	19,011	17,663	18,287	10,990
% of (A).....	3.0	10.9	10.4	8.2	6.9	14.3	11.6	10.4	11.8	10.0
% of (B).....	20.2	22.8	25.1	24.9	22.7	32.8	27.9	23.9	24.9	21.6
(G) Mining occupations.....	87	512	2,986	1,279	565	3,133	794	453	425	249

^a Based on classification of immigrants by intended occupation.^b Includes occupations classified as professional in the 1951 Census of Canada. Before April 1953 the Dept. of Citizenship and Immigration used an occupational classification which is not directly comparable with the present one. Although most of the occupations concerned were regarded as professional in both periods, a few adjustments were made in the data before 1953 to produce a more consistent series.^c The figures on skilled workers shown in this table represent the aggregate number of workers in occupations selected as closely as possible in accordance with the concept of skilled manpower adopted in this Report. Some of the occupations included in this selection were not coded separately before 1953. To produce a consistent series for the entire period the annual totals for these occupations up to 1953 were estimated on the basis of a sample tabulation.

Source: Compiled by Economics and Research Branch of the Dept. of Labour from information supplied by the Dept. of Citizenship and Immigration.

In absolute numbers, an estimated 36,276 immigrants arriving in Canada during 1951-55 were destined to the professional segment of the labour force. This number, averaging 7,255 per year, is more than three times as high as the number of professional workers immigrating during the preceding five years.

The increase in the number of skilled workers added to Canada's specialized manpower resources by immigration is likewise impressive. From 1951 to 1955 an estimated 93,677 skilled workers entered the labour force from other countries, an average addition of 18,735 per year, or substantially more than twice the 7,004 average recorded in the previous five years. It is estimated that in 1951 more than 27,000 immigrants, some 33% of all non-farm immigrant workers, were skilled. In the following three years approximately 18,000 to 19,000 skilled workers immigrated to Canada each year. In 1955, a year of relatively low immigration, their number fell to 11,000. Throughout most of this period from 1952 on, skilled workers made up a relatively stable proportion of total immigration.

Approximate Net Immigration 1946-55

The effect of immigration on the Canadian labour force is partly offset by emigration. Emigration statistics by occupation are only available for residents of Canada emigrating to the United States. While these statistics do not provide a complete count of emigrant workers, they do cover by far the largest part of total emigration from Canada. Recent immigrants returning to the countries of their origin are likewise not included. On the other hand, the data on net immigration shown in Tables 20 and 21 make no allowance for Canadian citizens returning from the United States and other countries to Canada. Returning Canadians, however, do not constitute a large group. During the first five postwar years, the number of Canadians returning from the United States was equal to 6.4% of immigration, and as the volume of immigration increased after 1950 the ratio dropped sharply to a five-year average of 2.7%.

A number of other qualifications should be borne in mind when using the figures on net immigration of skilled and professional workers. These are mentioned in the footnotes to the tables.

Professional workers 1946-50

During these years Canada suffered a net loss of professional workers, as in all but one of the years more professional workers emigrated to the United States than immigrated to Canada. The resulting loss to the Canadian labour force amounted to some 2,500. Emigration each year was relatively constant and in the last three years of the period varied above the 2,800 level by only a few score persons. The extent of the deficit, therefore, varied directly with the number of immigrant professionals entering Canada.

Table 20
APPROXIMATE NET IMMIGRATION OF PROFESSIONAL WORKERS TO CANADA, 1946-55^a

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Immigration ^b	1,429	2,414	2,970	2,118	1,801	4,850	7,329	8,588	8,350	7,159
Emigration to U.S. ^b	2,127	2,577	2,861	2,883	2,828	2,937	3,811	3,538	3,366	4,176
Approximate net immigration.	-698	-163	109	-765	-1,027	1,913	3,518	5,050	4,984	2,983

^a The figures on net immigration of professional workers shown in this table represent the difference between the number of professional workers immigrating to Canada from all countries and the number of professional workers emigrating from Canada to the U.S. The resulting annual balances should therefore be regarded only as an approximation of net immigration because they do not reflect migration from Canada to countries other than the U.S. While this omission cannot be avoided because of lack of other comparable data, it is nevertheless not a serious one as emigration to the U.S. accounts each year for by far the largest portion of emigration from Canada. It should also be noted that the annual balances shown do not include Canadians returning from other countries, nor the movement in the opposite direction of Canadian immigrants returning to the countries of their origin.

^b Both series include occupations classified as professional in the 1951 Census of Canada. Data on emigration to the U.S. are not available for calendar years before 1950; the figures shown here for 1946-49 represent averages for two U.S. fiscal years overlapping each calendar year. See also footnote b Table 19.

SOURCE: Compiled by Economics and Research Branch of the Dept. of Labour from information supplied by the Dept. of Citizenship and Immigration, and the U.S. Dept. of Justice.

Table 21
APPROXIMATE NET IMMIGRATION OF SKILLED WORKERS TO CANADA, 1946-55^a

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Immigration.....	2,172	6,983	12,995	7,763	5,106	27,726	19,011	17,663	18,287	10,990
Emigration to U.S. ^b	1,177	1,400	1,491	1,335	1,400	1,784	2,572	2,963	2,733	3,494
Approximate net immigration.	995	5,583	11,504	6,428	3,706	25,942	16,439	14,700	15,554	7,496

^a The figures on net immigration of skilled workers shown in this table represent the difference between the number of skilled workers immigrating to Canada from all countries and the number of skilled workers emigrating from Canada to the U.S. The resulting annual balances should therefore be regarded only as an approximation of net immigration because they do not reflect migration from Canada to countries other than the U.S. While this omission cannot be avoided because of lack of other comparable data, it is nevertheless not a serious one as emigration to the U.S. accounts each year for by far the largest portion of total emigration from Canada. It should also be noted that the annual balances shown do not include Canadians returning from other countries, nor the movement in the opposite direction of Canadian immigrants returning to the countries of their origin.

^b Before 1955 the data on emigration of skilled workers were not available in sufficient detail to make it possible to compile an emigration series applying to exactly the same group of occupations as were included in the immigration series. In this table the emigration figures available by broad occupational groups for 1946-54 were adjusted to produce a comparable series. Both series exclude mining occupations which in other parts of this Report are included in the group of occupations defined as skilled.

SOURCE: Compiled by Economics and Research Branch of the Dept. of Labour from information supplied by the Dept. of Citizenship and Immigration, and the U.S. Dept. of Justice.

The net losses, however, were probably not as great as these figures suggest, for many professional persons who came to Canada under group movements or as displaced persons first went into primary industries since they were not encouraged to come as professional workers. Some no doubt later gained employment in fields more in keeping with their professional qualifications.

Skilled workers, 1946-50

From 1946 to 1950, the approximate net immigration of skilled workers amounted to some 28,000 persons. It increased from nearly 1,000 skilled workers in 1946 to over 11,000 in 1948, falling back to some 3,700 in 1950. During this period the number of skilled workers emigrating to the United States varied only slightly within the 1,200 to 1,500 range. In effect, the net immigration of skilled workers depended largely on the number of skilled workers immigrating to Canada.

For the whole period some 6,800 skilled workers are recorded as having emigrated to the United States. It was relatively more difficult to emigrate to the United States from Canada during these years than in the later years because of housing shortages and a slack labour market in the United States following postwar dislocations and the internal problems of absorbing ex-servicemen into employment.

Professional workers, 1951-55

During these five years, approximate net immigration of professional workers amounted to some 18,000 persons in contrast to a net loss of 2,500 in the first five-year period. Immigration of professional workers increased from 4,850 in 1951 to a peak of 8,588 in 1953, declining to 7,159 in 1955. During these years, emigration of professional workers remained below 4,200 a year. Thus from 1951 to 1955, net immigration contributed a good deal to Canada's total resources of professional manpower.

Skilled workers, 1951-55

During these years Canada experienced a very marked increase in the net immigration of skilled workers, which is estimated to have been close to 80,000. On a "net" basis, almost three times as many skilled workers were added to Canada's skilled labour force by migration as during the first five-year period. The year 1951 alone accounted for almost a third of the total increment of skilled workers for the five years. After 1951, net immigration of skilled workers held level at about 14,000 to 16,000, and then dropped to some 7,500 in 1955. It is significant, however, that during this period the number of skilled workers emigrating from Canada, some 13,500 was twice as great as during the previous five-year period. This is probably accounted

for by the increased demand for skilled workers and the consequent greater ease of entry to the United States. It is disturbing to note that these years showed a fairly consistent rise in the number of skilled workers entering the United States from Canada, with twice as many emigrating in 1955 as in 1950.

The Sources of Supply, 1946-56

At the beginning of this chapter, formal training, immigration and on-the-job training and upgrading were listed as the basic sources of professional and skilled workers, who now represent a substantially larger proportion of Canada's labour force than 25 years ago. During the first 10 postwar years alone, professional and skilled workers in Canada increased by an estimated 373,000. To this growth, each of the three sources of specialized manpower made a large contribution. There were, however, wide differences in the extent of the contribution of each source to the supply of professionals on the one hand, and skilled workers on the other; the relative importance of each source also varied from one occupation to another.

It is fairly certain that informal on-the-job training and upgrading contributed more to the postwar increase in the number of skilled workers than either immigration or formal apprenticeship training. However, the extent to which skilled manpower resources were augmented by informal on-the-job training can only be assessed indirectly, because statistical information on this type of training is almost completely lacking.

The increase in the number of skilled workers in Canada during the first 10 postwar years is estimated to total 280,000. To attain this net increase, the total supply of skilled workers must have been much larger because skilled workers who died, retired or left their trade for other reasons also had to be replaced. The contribution made by immigration to gross supply, which was considerably more than 280,000, was close to 110,000 after deduction for emigration. The information on apprenticeship and on other types of formal training outside vocational schools is not sufficiently complete to indicate with any precision the number of skilled workers produced in this way. Such data as are available suggest that the contribution from this source certainly did not match that from net immigration, and in all probability was less than half as large. This points to the conclusion that informal on-the-job training and upgrading, alone or in combination with training in vocational schools or with incompleated apprenticeship training, provided more skilled workers during the first 10 postwar years than either immigration or full apprenticeship training.

The fact that informal on-the-job training and upgrading was a very large source of skilled manpower is also borne out by the 1956 survey of requirements for skilled tradesmen discussed in Chapter 2. This survey showed that

of the manufacturing establishments with requirements for skilled tradesmen during 1955-56, 59% obtained skilled workers through informal on-the-job training and upgrading, while only 24% obtained qualified workers from their own organized trade training programmes. Of the establishments obtaining skilled tradesmen through on-the-job experience and upgrading, 55% met most of their requirements from this source. Organized trade training programmes, on the other hand, met the majority of requirements for skilled tradesmen in only 41% of establishments with this type of training.

Although Canadian apprenticeship training did not contribute large numbers to the postwar supply of skilled workers, it was nevertheless essential because it made a significant contribution to the hard core of the most highly-qualified tradesmen. The volume of apprenticeship training, moreover, has increased somewhat in recent years, and there is some evidence that the increase was due not only to the growing size of the trainable age group but also to a slight increase in the proportion of youths undertaking apprenticeship training. The figures suggesting such a trend are set out in Table 22 which shows the number of apprentices, in percentage terms, in relation to the number of male youths in the 15 to 19 age group. Such ratios, of course, overstate the rate at which young men 15 to 19 years of age participate in apprenticeship programmes, since some apprentices are more than 19 years old and, in manufacturing, some apprentices are women. But the comparison is valid as a measure of change over a period of time. As the table shows, during the six years from 1951 to 1956, apprentices in the building trades and in manufacturing represented a moderately increasing proportion of the 15 to 19 age group, even though this group too was growing in size. The uptrend was accompanied by an increase in enrolments in industrial day classes in vocational and technical schools, which alone do not produce fully qualified tradesmen, but which provide useful pre-employment training. From 1947 to 1951, enrolments in industrial courses in Canada, excluding Quebec, totalled approximately 19,000 and by 1954 had risen to about 27,000. The rather modest increase in the volume of apprenticeship training and vocational and technical school enrolments since 1951, however, has not matched by any means the growth in requirements for skilled workers.

While formal training provided relatively few skilled workers in Canada in the first 10 postwar years, it was the largest source of professional manpower. The importance of formal training in this field is quite natural, for formal education in college or university constitutes by far the most important if not the only avenue of entry into some professional occupations. And even such professionals as teachers, accountants or registered nurses, who need not be college graduates, require varying periods of specialized training above the secondary school level.

Table 22
APPRENTICES AND ENROLMENT IN INDUSTRIAL VOCATIONAL CLASSES AS PERCENTAGE OF
MALE POPULATION 15 TO 19 YEARS OF AGE, 1951-56

Year	Index of male population 15 to 19 years of age Canada	% of male population 15 to 19 years of age		
		Apprentices in building trades eight provinces ^a %	Apprentices in manufacturing ^b Canada %	Enrolment in industrial vocational day classes nine provinces ^c %
1951.....	100.0	1.63	—	5.50
1952.....	101.8	1.57	—	—
1953.....	103.1	1.63	1.20	—
1954.....	105.6	1.73	1.22	6.97
1955.....	108.2	1.82	—	—
1956.....	111.3	1.94	1.53	—

^a Excludes Prince Edward Island and Quebec; includes Newfoundland from 1954. Population figures adjusted accordingly.

^b Excludes auto repair and garages.

^c Excludes Quebec. Population figures adjusted accordingly.

SOURCE: Population Estimates, D.B.S. and Tables 11, 15 and 17.

It is estimated that between 1946 and 1956 the number of professional workers in Canada increased by about 94,000. Once again, the gross supply that produced this increase must have been larger than 94,000 because of the need to replace professional workers who died, retired or left for other reasons. During these 10 years, college and university graduations in Canada totalled approximately 134,000. The number of graduations was virtually the same in the two halves of the postwar decade: veteran graduations played a significant role in the first half, and higher enrolments of college-age population compensated in part for the drop in veteran enrolment in the next five years. Not all of the 134,000 graduates, many of whom were women, entered professional occupations. On the other hand, the total number of graduations does not include professionals who entered the labour force during the same period after completion of some other type of formal training on the post-secondary school level.

Immigration contributed about 47,000 professional workers to the supply during the first 10 postwar years. Much of this gain, however, was offset by the emigration of about 31,000 professionals to the United States. In the first five years, the outflow of professional workers to the United States was actually greater than the gain from immigration. In the next five years, when immigration reached a much higher level, the number of professional workers among immigrants outnumbered professionals emigrating to the United States by about 18,000. It should be recalled that these figures are based on a slightly broader group of occupations than the estimate of the net increase in the number of professionals in Canada, but the difference is not sufficiently great to invalidate the conclusion that to the total increase of 94,000 professionals, net immigration contributed close to 16,000.

It may appear at first glance that the 134,000 university graduations, together with the output of other training institutions on the post-secondary school level and a net immigration of 16,000, would have been more than sufficient to increase the number of professional workers in Canada by 94,000 during the 10-year period. There is, however, no indication that professional workers were actually in oversupply at any time during this period. On the contrary, widespread shortages occurred in a number of professional occupations, particularly in the engineering fields. In a number of professional occupations, therefore, the new supplies available from graduations and net immigration were not sufficient to meet the requirements arising from the rapid economic expansion of the last decade and the need to replace losses due to deaths, retirements and movements out of the professional field for other reasons.

THE OUTLOOK FOR SPECIALIZED MANPOWER, 1956-65

AS IN THE PAST, the extent to which the supply of specialized manpower meets requirements will depend to an important degree on the capacity and character of training facilities in Canada. It is not likely that the basic decisions which have to be made about the scope and character of these facilities will be planned for more than a decade in advance. Thus it does not seem fruitful to analyze requirements and supplies of specialized manpower for more than 10 years ahead. Moreover, the quality and quantity of statistical information available in this field does not provide an adequate basis for a projection farther into the future.

This chapter deals with the prospective supplies of and requirements for specialized manpower during the decade 1956-65. On the supply side, projections are made of the number of young persons of trainable age, the output of apprenticeship training programmes, university graduations, and immigration and emigration of specialized manpower. On the requirement side, consideration is given to the changing character of demand for professional workers and skilled tradesmen and an attempt is made to estimate requirements for these workers during the decade. Some of the implications of these estimates for training and higher educational facilities during the next decade are mentioned in the concluding portion of the chapter.

It should be emphasized that the several projections developed in this chapter are not forecasts. They are based on the review in earlier chapters of the trends in specialized manpower supplies and requirements and on assumptions about the probable course of future developments. Although an attempt is made to use such assumptions as appear to be most realistic, alternative assumptions might, of course, have been used and different results obtained. As a rule, the assumptions used are conservative and do not usually envisage any dramatic changes from recent trends.

Supply of Youth of Trainable Age

As in the past, supplies of skilled and professional workers in the future will depend in large measure on the number of persons of training age in the population. It is a rather remarkable fact that the population aged 15 to 19, the age span when most persons enter the labour force or begin specialized training, has remained practically unchanged for the last 20 years. From 1935 to 1955, when national income, the labour force, and the number of professional and skilled workers were increasing rapidly, the number of persons 15 to 19 years old in Canada varied only slightly between 1,040,000 and 1,130,000. During these years it was not possible to meet Canada's substantial requirements for specialized manpower by growth in the population of training age.

The virtual stagnation in the growth of the 15 to 19 age group during the last 20 years is illustrated in Chart VII. As the chart shows, the size of this age group in 1945 was actually smaller than five years earlier, and only slightly larger than in 1935. During the first 10 postwar years the number of persons aged 15 to 19 increased slightly, by about 27,000 males and 16,000 females. Table 23 shows, however, that most of this increase resulted from the addition of Newfoundland in 1948 and from the relatively large net immigration after 1950.

Table 23

CHANGES IN POPULATION 15 TO 19 YEARS OF AGE, CANADA, 1935-55, WITH PROJECTIONS FOR 1955-65

(thousands)

	1935-40	1940-45	1945-50	1950-55	1955-60	1960-65
<i>Males, 15-19</i>						
At June 1 — beginning of period	525	570	548	542 ^a	575	709
Change due to aging of population	+48	-18	-21	+23	+122	+159
Immigration	+3	+2	+11	+25	+12 ^c	+12 ^c
Emigration and error of estimate ^b	-6	-6	-12	-15	—	—
At June 1 — end of period . . .	570	548	526	575	709	880
<i>Females, 15-19</i>						
At June 1 — beginning of period	515	560	538	532 ^a	554	677
Change due to aging of population	+49	-18	-19	+18	+114	+165
Immigration	+3	+3	+12	+19	+9 ^c	+9 ^c
Emigration and error of estimate ^b	-7	-7	-15	-15	—	—
At June 1 — end of period . . .	560	538	516	554	677	851

^a Newfoundland included in this and subsequent figures.

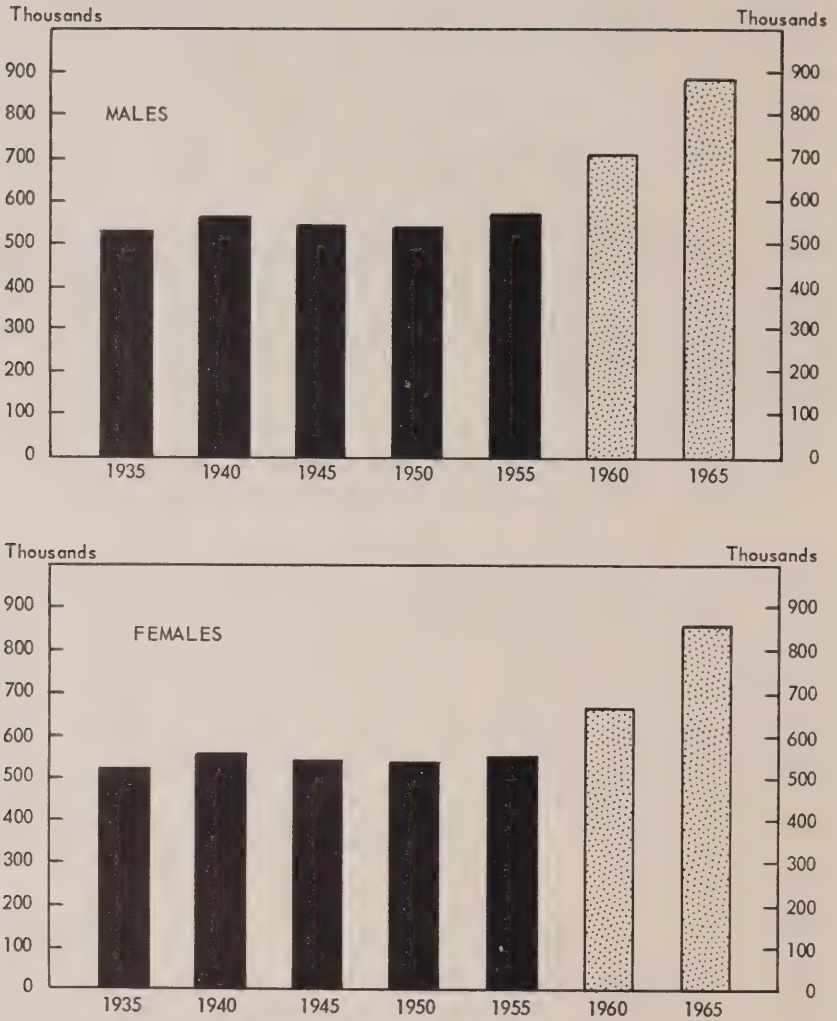
^b Residual change in estimated population, over five-year period, not accounted for by estimated effect of aging of population, or by immigration.

^c Change due to assumed net immigration of 75,000 per year.

SOURCE: D.B.S. and Economics and Research Branch, Dept. of Labour.

Chart VII

POPULATION 15 TO 19 YEARS OF AGE, CANADA, 1935 - 1955
WITH PROJECTIONS FOR 1960, 1965



Source: Dominion Bureau of Statistics and
Economics and Research Branch, Department of Labour.

The probable trend in the size of this age group for the years 1956-65 can be estimated from the number of young persons who were between the ages of 5 and 14 in 1955. Such an estimate suggests that natural population growth alone will produce a very substantial increase in the number of persons 15 to 19 years old over the next 10 years. This increase can be expected to amount to 236,000 between 1955 and 1960, and 324,000 between 1960 and 1965. Projected on this basis, and allowing for a total net immigration of 75,000 per year, Canada's population 15 to 19 years of age, numbering 1.1 million in 1955, will increase to 1.4 million by 1960 and to 1.7 million by 1965.

An increase of this magnitude will represent a very substantial addition to the number of youths available for specialized training. The increase will be of particular significance for the prospective supply of skilled tradesmen as most of them begin formal training between the ages of 15 and 19. The supply of professional workers, most of whom are university graduates, is related to a somewhat older age group, approximately between the ages of 18 and 21. During the first 10 postwar years the number of persons in this age group, too, remained fairly stable. As was shown in Table 8, Canada's population of college age totalled 867,000 in 1946. Between 1946 and 1955 the number of persons in the 18 to 21 age group rose by only 3%, while total population increased by nearly 27%. In the next 10 years, however, the size of the college-age group will increase appreciably. Its rate of growth will not at first be as great as that of the 15 to 19 age group, but from 1960 to 1965 it will be almost as high. It is estimated¹ that the number of men and women of college age in Canada, at 894,000 in 1955, will rise to 1,007,000 by 1960, and 1,245,000 by 1965. Thus in the years ahead substantially larger numbers of young persons in Canada will become available for professional, technical and trades training.

Prospective Apprenticeship Completions

The discussion of apprenticeship training in Chapter 3 has pointed up in part the statistical gaps that make it difficult to assess the extent of such training in a comprehensive way. The lack of accurate data is a particularly important limiting factor when it comes to determining the number of qualified tradesmen and other skilled workers produced by apprenticeship training. Nevertheless, on the basis of such information as is available, the contribution of formal apprenticeship training to Canada's resources of skilled manpower was estimated to have been about 50,000 over the first 10 postwar years.

As mentioned above, during these years the number of persons aged 15 to 19, the age span during which most apprentices begin their training, was virtually unchanged. Since most apprentices are men, the number

¹Estimate based on a population projection made by the staff of the Commission, assuming a net immigration of 75,000 per year.

of males in this age group is particularly significant. In 1945 this number stood at 548,000, and after a small decline in the next few years it increased slowly to 575,000 by 1955. For the decade as a whole, the number of male youths aged 15 to 19 averaged about 555,000. In the next 10 years, however, the size of this age group will increase considerably. It is estimated that between 1955 and 1965 the number of males 15 to 19 years of age will average approximately 721,000, a 30% increase over the average for the preceding decade.

If about the same proportion of young persons enters and completes apprenticeship training in 1956-65 as in the preceding 10 years, the supply of skilled tradesmen produced by apprenticeship training will rise by about 30%, to some 65,000 for the 1956-65 decade. Projected on this basis, however, the prospective number of completions reflects the average rather than the most recent rate at which persons in the 15 to 19 age group entered apprenticeship training. This distinction is rather important, for as was observed in Chapter 3 the participation rate of this age group in apprenticeship training has increased in recent years. For the building trades in the eight provinces in which apprentices register with provincial authorities, the rate in 1956 was at least 15% higher than the 10-year average up to that year. Comparable data on other trades are not available, but there is some evidence that the proportion of youths entering apprenticeship in the manufacturing trades has followed a similar pattern.

In the light of this trend it seems reasonable to assume that in 1956-65 the participation rate will remain at least as high as at the end of the preceding decade. This, in turn, suggests that the number of completions in 1956-65 will exceed the total projected on the basis of the average rate for the preceding 10 years, and that the difference should be about the same as the difference between the average participation rate for the preceding decade and the participation rate at the end of the decade. For the construction trades this difference amounted to at least 15%, and it was probably similar for other trades. Projected on this basis, the supply of skilled workers produced by apprenticeship training in the 1956-65 period should be at least 75,000. More likely than not, however, the increase in the participation rate has not yet run its course. The 75,000 total, therefore, may underestimate the extent to which the proportion of youths entering apprenticeship training will increase further in the future. Moreover, it is to be expected that together with the uptrend in completions the number of apprentices who discontinue formal training will also rise. As in the past, many of these will probably become qualified skilled workers through subsequent on-the-job experience.

It must be borne in mind, of course, that the entire projection rests on the estimate of past completions, which was used as a starting point. Thus the absolute number of completions in the future may be higher or lower, depending on the error in the original estimate. Such an error, however,

is of no consequence for the relative size of the projected increase. It thus seems fairly certain that in 1956-65 completions will be at least 50% higher than in the preceding decade.

An increase of this size will, of course, be contingent upon an expansion of workshop and classroom facilities for apprenticeship training. Failure to expand such training facilities would mean in effect that in the years ahead a smaller proportion of youths than at present could avail themselves of formal apprenticeship training.

Prospective University Graduations

The growth of Canada's population of college age in the next decade will contribute to a rise in college and university enrolments and ultimately to an increase in the number of graduations, providing university and college facilities expand sufficiently. As shown in Table 24, undergraduate enrolment in Canada, at 64,300 in 1955, may be expected to rise to 89,000 by 1960, and 126,500 by 1965. This projection is based on the assumption that the proportion of college and university students in the population of college age will continue to increase at about the same rate as it has since World War II. In 1946 the number of non-veteran undergraduate students in Canada was equal to 4.8% of the population between the ages of 18 and 21. By 1956 this proportion had risen to 7.5%. A projection at the same rate of increase indicates a participation rate of 8.8% by 1960, and 10.2% by 1965. Such a projection does not appear unreasonable in the light of the growing demand for professional personnel likely to occur over the next decade.

Table 24

PROJECTION OF UNDERGRADUATE ENROLMENT AND GRADUATIONS, CANADA, 1956-65

Academic year	Undergraduate enrolment ^a	Average of previous four years' enrolment	Graduations ^b (first degree)
1952-53.....	60,000	—	—
1953-54.....	61,200	—	—
1954-55.....	64,300	—	—
1955-56.....	68,300	63,400	11,900
1956-57.....	74,600	67,100	12,500
1957-58.....	78,700	71,500	13,400
1958-59.....	83,600	76,300	14,300
1959-60.....	89,000	81,500	15,200
1960-61.....	95,100	86,600	16,200
1961-62.....	101,900	92,400	17,300
1962-63.....	109,400	98,800	18,500
1963-64.....	118,000	106,100	19,800
1964-65.....	126,500	114,000	21,300

a 1952-57, actual; 1958-65, projection based on the assumption that by 1965 the proportion of undergraduate students in Canada will have risen to 10.2% of the college-age population.

b For the years 1930-46, graduations averaged 18.7% of the previous four years' average of undergraduate enrolment. The projection of graduations for 1956-65 has been calculated on the same basis and the resulting totals rounded to the nearest 100.

SOURCE: Economics and Research Branch, Dept. of Labour. Actual figures: D.B.S.

The prospective increase in undergraduate enrolments will be reflected in the number of graduations. As calculated in Table 24, the number of first degrees conferred by Canadian colleges and universities may be expected to rise from 11,900 in 1956 to 15,200 by 1960 and 21,300 by 1965. On this basis graduations may be expected to total 67,300 in the five years from 1956 to 1960, and 93,100 from 1961 to 1965.

Prospective Immigration

It was observed earlier in this Report that in the first postwar decade immigration was a very important source of specialized manpower, particularly of skilled manpower. Will immigration play a similar role in the 10 years from 1956 to 1965?

It is impossible, of course, to answer such a question with any degree of assurance, not only because future trends may be affected by government policies, but also because the many factors that bring about migration are unpredictable, or at any rate uncertain.

The uncertainties about the volume of immigration do not, however, preclude the forming of some kind of expectation that, barring a major war, or a drastic economic reversal, may appear to be reasonable in the light of past trends. During the first 10 years after World War II, annual immigration ranged from 64,000 to 194,000 a year and averaged approximately 120,000 a year over the decade. During the 15 years before this the volume of immigration did not come anywhere near this annual average. The world depression of the '30's brought in its wake severe restrictions on migration to Canada and the flow of immigrants shrank to a trickle, averaging less than 17,000 a year from 1931 to 1939. The outbreak of World War II reduced the number of immigrants even further, with the result that during the six years from 1940 to 1945 only 72,000 persons entered Canada as settlers.

In contrast with the 15 years between 1930 and 1946, the first three decades of the century were a period of heavy immigration. Between 1903 and 1914, new settlers arrived at an average rate of nearly 250,000 a year. The wave of immigrants reached its crest in 1913 when over 400,000 entered. This great flow was interrupted by World War I, and the peak of 1913 has not been approached since. The volume of immigration was fairly high through the '20's, however, when new settlers arrived at approximately the same rate as in the past 10 years.

Immigration to Canada has been highest during prosperous periods, with very marked declines during times of depression or war. It is assumed that in the 10 years ahead there will be no general war or major depression, and that Canada will enjoy a decade of prosperity similar to that of the last

10 years. The immigration patterns of the '30's can therefore be dispensed with in forming any expectation for the next decade. There remain three periods bearing some resemblance to the conditions expected to prevail in 1956-65.

In the first of these periods, roughly from the turn of the century to World War I, immigrants were arriving in increasingly larger numbers averaging nearly 250,000 a year. In the other two buoyant periods, extending over the '20's and the decade since World War II, respectively, immigration averaged approximately half the pre-World War I figure.

It is unlikely that in 1956-65 immigration could again reach the volume attained in the years before World War I. Forty years ago the "old" countries—Italy, Greece, Spain, Portugal, the Austrian monarchy, Czarist Russia, Ireland and Great Britain—were countries of rapid population growth in which most of the people, the potential emigrants, had a relatively low standard of living. Population pressure was due to population increase, to an unequal income distribution, to a system of land tenure which precluded the absorption of surplus farm population, and to a slow rate of industrial expansion in relation to population growth. The New World was sparsely populated, it had enormous reserves of arable land, which immigrants could obtain free or on easy terms, and industrial expansion was much more rapid than in Europe. Taking a longer view, immigrants had much better prospects in the New World.

Today, the distinction between the old countries and the New World is less marked. In Europe the rate of population growth has declined sharply and changes in the distribution of national income, technical progress and provisions for social security have substantially raised the living standard of the lower income groups. The New World has become more densely populated, its reserves of arable land have largely disappeared, and provisions for social welfare are generally less favourable than in many European countries. Finally, prospective emigrants from Eastern European countries, which before World War I were among the most important countries of emigration, now live within the Soviet orbit and find themselves unable to leave because of the restrictions imposed by the existing governments. The impact of all these forces has brought about a profound change in the pattern of international migration, and it is highly improbable that, in the 10 years that lie ahead, immigration to Canada could again reach the volume of the pre-World War I period.

There remain then only two other periods that may offer some clue to future trends. During the '20's and the 10 years following World War II, immigrants were arriving in approximately the same numbers. It seems appropriate, therefore, to attach greater weight to the latter period which

for projection purposes, offers the advantage of continuity with the 1956-65 period.

During the decade following World War II, more than 1,200,000 persons entered Canada as settlers. It was pointed out earlier in this Report that the annual rate of immigration during this period showed marked fluctuations from year to year; that immigration during the first five years was substantially lower than for the subsequent five years; and that if immigration of displaced persons—a movement which may not recur on a comparable scale in the next decade—is subtracted from total immigration for each year, the resulting difference in the volume of immigration becomes even more striking. Without displaced persons, immigration averaged 63,000 a year from 1946 to 1950 and more than twice as much, approximately 148,000, from 1951 to 1955. This difference was attributed partly to unsettled world conditions in the immediate postwar period and partly to the restrictions on immigration in force in Canada until mid-1950. Because of the unusual conditions existing in the first five years following World War II, it would seem more appropriate to estimate potential immigration over the next 10 years mainly on the basis of the last five years in the postwar decade, assuming that Canadian immigration policy will remain essentially the same as it has been since 1951.

Counting the movement of displaced persons, which was still substantial in 1951, immigration during 1951-55 averaged 158,000 annually, ranging from 194,000 in 1951 to 110,000 in 1955. Without displaced persons, the number of immigrants was within 10,000 of the 158,000 mark in all but the last year of the five-year period. It is reasonably certain that the drop to 110,000 in 1955 was due to a temporary reduction of available supply rather than to any basic scarcity of eligible migrants. In 1956 total immigration was once again about 160,000, and there is every indication that in 1957 it will be considerably higher. It is not likely, however, that a combination of circumstances such as those which led to the upsurge of immigration in 1957 will recur in the foreseeable future. It seems reasonable to base the expectation of immigration for the balance of the 1956-65 decade on the pattern that developed before the 1957 peak. Such an expectation will then be related essentially to the supply of eligible migrants in recent years, with the proviso that the supply is perhaps more elastic than the recent figures suggest, and probably will remain so in the future.

Table 25, covering the years from 1951 to 1955, shows the ethnic composition² of immigration from overseas and the number of immigrants to Canada from the United States. The table also shows the rates of immigra-

²A classification by country of last permanent residence would reflect more accurately the volume of migration from individual countries overseas as, for instance, not all Germans (taken as an ethnic group) who immigrate to Canada resided previously in Germany. However, a comparison of the two classifications shows that divergencies of this kind are relatively not very numerous and therefore not sufficiently significant to invalidate the conclusions that can be drawn from the data. The choice of the ethnic classification rather than that by last permanent residence is preferable in this instance because only the former is also cross-classified by occupation.

tion that it appears reasonable to anticipate for the balance of the 1956-65 decade, assuming no major war or economic upheaval in the years ahead. As mentioned earlier, the rates of immigration anticipated here for 1958-65 cannot be regarded as a forecast because of the many unpredictable factors entering into the picture even if the major assumptions prove correct. Nor does the anticipated annual average, at 137,000, relate in any way to calculations of the future capacity of Canada to absorb immigrants. The eight-year average lies somewhere near the halfway mark of the range of expectations of the supply of available immigrants that can be formed on the basis of the 1951-55 trends, although in some cases the expectation was modified in the light of longer-run considerations. The three largest components for which the prospective rates were modified in this way include the British, German and Netherlander ethnic groups.

The expectation of British³ immigration is based in part on the traditional propensity of the population of the British Isles to emigrate to Commonwealth countries. Unlike nationals of most other countries, British subjects from the United Kingdom and the citizens of the Republic of Ireland were not affected by the more restrictive Canadian immigration policies in effect before 1951. Both before 1951 and from 1951 to 1955 the volume of British immigration to Canada showed substantial fluctuations, with no clear upward or downward trend. On a five-year basis, however, it was somewhat lower in the first half of the postwar decade than in the second half. From 1951 to 1955 British immigrants averaged about 39,000 annually, an increase of about 5,000 over the preceding five-year average. The difference between the two periods would have been somewhat greater if the immigration totals for the first five years had not contained elements of non-recurrent migration, such as the exodus of dependents of members of the Canadian armed forces, or the arrival of British settlers who would have emigrated to Canada in earlier years if they had not been prevented from coming because of the war. After a drop in 1955, immigration from the British Isles in 1956 was higher than at any time since 1946; and it is almost certain that, partly because of the Suez crisis, the 1957 total will be at least twice as high as the 1951-55 average. It would perhaps be unrealistic to expect that the flow of British immigrants could continue at anywhere near the 1957 level, but the recent upsurge together with the pattern during 1946-56 does suggest that in the years ahead Canada is likely to attract more rather than fewer British immigrants. On such an assumption the annual average rate anticipated for 1958-65 has been set at 45,000.

Immigration of persons belonging to the German and Austrian ethnic group is difficult to estimate in advance because the experience of the past five years cannot be regarded as indicative of long-run trends. If symptoms of population pressure could have been expected in any Central and Northern

³The term British is used here to denote an ethnic group comprising the English, Irish, Scottish and Welsh.

Table 25
IMMIGRATION TO CANADA 1951-55 AND PROSPECTIVE AVERAGE ANNUAL IMMIGRATION
1958-65, BY ETHNIC ORIGIN

Ethnic group	Number of immigrants					Prospective annual average, 1958-65
	1951	1952	1953	1954	1955	
British ^a	31,370	42,675	47,077	44,593	30,150	45,000
German and Austrian						
Non-D.P.....	25,879	27,607	38,589	33,686	19,861	22,000
D.P.....	6,516	650				
Italian.....	24,351	21,383	24,293	24,595	20,247	25,000
Netherlander.....	19,130	21,213	20,472	16,340	6,929	8,000
U.S.b.....	7,732	9,306	9,379	10,110	10,392	10,000
Other.....	79,413	41,664	29,058	24,903	22,367	27,000
Belgian.....	2,638	1,349	1,431	1,328	988	
French.....	6,193	4,212	3,136	2,813	2,225	
Greek.....	2,885	1,691	2,059	2,892	3,014	
Scandinavian.....	10,455	6,096	4,221	3,434	3,024	
Spanish and Portuguese.....	828	568	812	1,531	1,716	
Swiss.....	1,061	1,274	826	961	597	
Yugoslavian.....	4,144	2,176	1,999	1,541	1,375	
European ethnic groups in the Soviet orbit.....	39,724	15,408	7,586	5,397	4,159	
Hebrew.....	6,599	5,177	3,583	1,334	1,084	
Chinese and Japanese.....	2,700	2,319	1,975	2,021	2,672	
Other.....	2,186	1,394	1,430	1,651	1,513	
Total.....	194,391	164,498	168,868	154,227	109,946	137,000

^a Includes English, Irish, Scottish, Welsh.

^b Only immigrants other than from the U.S. are classified by ethnic origin. Figures on immigrants from the U.S. include all immigrants with last permanent residence in that country, regardless of ethnic origin.

Source: Compiled by the Economics and Research Branch of the Dept. of Labour from information for 1951-55 supplied by the Dept. of Citizenship and Immigration.

European country, it was in postwar Germany. Yet in 1952, the Government of the German Federal Republic, in a report to the Organization for European Economic Co-operation, took the position that in spite of the large number of unemployed at that time, no large-scale emigration was needed.

Developments in Germany since 1952 have on the whole justified this stand, and it is unlikely that population pressure in Germany will be a significant factor in promoting emigration in the near future. It is probable, therefore, that the volume of German emigration in the next few years will be largely determined by the desire rather than the need to emigrate so that any estimate of the future trend must necessarily be very uncertain. The figure adopted here for projection purposes is 22,000. This average annual rate is somewhat higher than the total for 1955, but lower than the annual rates for earlier years, for it is assumed that the fairly high totals for 1951-54 were due in part to the restrictions on German immigration to Canada in the early postwar years and possibly also to the somewhat higher levels of unemployment in Germany before 1955.

The Netherlands has adopted a policy of actively encouraging its citizens to emigrate. This policy is dictated not by structural unemployment, but by fear of over-population. With its high rate of population increase the Netherlands will have difficulty in future in finding employment for the yearly additions to its labour force. It has been estimated that between 20,000 and 40,000 persons will have to emigrate each year if the country is to maintain a satisfactory demographic balance.⁴ Despite their government's policy of promoting emigration, however, Netherlands citizens are showing less readiness to leave their country. Canada's share of Dutch emigrants in 1951-53 amounted to approximately 20,000 per year. In 1954, Dutch immigration to Canada declined to 16,000 and in the following year dropped sharply to just under 7,000. The high immigration figures for 1951-53 probably reflect such non-recurrent pressures on the supply side as the heavy migration back to the Netherlands of Dutch residents from Indonesia and the backlog of prospective emigrants that accumulated because of restrictions on immigration to Canada in the first five postwar years. In view of this, the figure of 8,000 does not seem unreasonable as an estimate of the average annual rate of Dutch emigration to Canada over the next 10 years. This figure is in line with the lower estimate of the total annual emigration necessary from the Netherlands in the near future, *i.e.*, 20,000 per year.

Immigration of Specialized Manpower

The expectation of future immigration of professional and skilled manpower is based on the assumption that skilled and professional workers will

⁴Attilio Oblath, "The Problem of Surplus Manpower in Europe", *International Labor Review*, September-October, 1954, p. 303.

represent a fairly predictable proportion of total immigrants within each of the major ethnic groups. The relative weight of the skilled and professional groups in total immigration over the last ten years was indicated in Table 19, which shows that, with the exception of one or two years, the proportion of skilled workers remained fairly stable throughout the postwar period. The proportion of professional workers, approximately 2.5% in the early postwar years, has shown a distinct increase in more recent years. However, the proportions of skilled or professional workers are far from uniform for the different ethnic groups that make up total immigration in any given year. Because there is reason to expect that the ethnic composition of prospective immigration will not be the same as that in the first 10 postwar years, it is necessary to determine the recent occupational characteristics of at least the major ethnic groups before projecting immigration for the skilled and professional groups.

As Table 26 shows the proportion of skilled workers among British immigrants was the second highest, 19%, in 1951; by 1955 the percentage had declined to 8.3 which was below the general average for all ethnic groups, although the over-all average has also tended to decline in recent years. Despite year-to-year fluctuations, the proportion of skilled workers in the Netherlands and United States groups remained consistently below the general average, while the German ratio, with the exception of 1952, exceeded the average by a substantial margin.

Table 27 indicates the recent ratios of professional workers for each of the principal ethnic groups. From 1951 to 1955 the proportions of professional workers, unlike those of skilled workers, increased for almost all ethnic groups. The ratios for the British and United States groups were substantially higher than the general average, while those for the German and particularly the Italian ethnic groups were much lower.

It is estimated that during 1956 and 1957, the first two years of the 1956-65 decade, immigration of professional workers will amount to about 22,000, and that of skilled workers to about 48,000. The estimates for the subsequent eight years, shown in Table 28, are based on the expectation that total immigration will average 137,000 annually. It is further assumed (cf. Table 25) that immigrants belonging to the five major ethnic groups shown separately will number about 110,000, or 80% of this total.

In the British group, at 45,000, the proportion of professional workers is expected to remain near the 1953-56 average of about 11%. For prospective immigrants from Germany and Italy the ratio has been projected at 2% and 0.4%, respectively; recent trends were likewise used as a yardstick for the remaining ethnic groups.

Table 26

IMMIGRATION OF SKILLED WORKERS TO CANADA BY ETHNIC ORIGIN, 1951-55^a

Ethnic origin	Skilled workers				
	1951	1952	1953	1954	1955
British.....	5,953	6,033	5,698	5,041	2,516
Percentage (A).....	19.0	14.2	12.1	11.3	8.3
Percentage (B).....	35.8	28.1	22.3	20.6	15.1
German and Austrian.....	6,273	3,039	5,038	5,683	2,957
Percentage (A).....	19.4	10.7	13.0	16.9	14.9
Percentage (B).....	38.3	28.5	30.2	34.3	31.2
Italian.....	2,611	2,047	1,587	2,466	2,415
Percentage (A).....	10.7	9.6	6.5	10.0	11.9
Percentage (B).....	25.1	24.3	16.7	21.2	28.3
Netherlander.....	925	1,192	1,503	1,799	564
Percentage (A).....	4.8	5.6	7.3	11.0	8.1
Percentage (B).....	32.6	28.7	29.5	35.1	24.4
U.S. ^b	411	405	373	385	335
Percentage (A).....	5.3	4.3	4.0	3.8	3.2
Percentage (B).....	13.8	11.2	9.8	9.7	8.4
Other.....	11,553	6,275	3,464	2,913	2,203
Percentage (A).....	14.5	15.1	11.9	11.7	9.8
Percentage (B).....	32.6	31.9	26.1	24.9	22.0
Total, skilled workers.....	27,726	19,011	17,663	18,287	10,990
Percent of total immigration.....	14.3	11.6	10.4	11.8	10.0
Percent of all immigrants destined to non-farm labour force.....	32.8	27.9	23.9	24.9	21.6

NOTE: Percentage (A) = the proportion that skilled immigrants of a given ethnic group represented each year of total immigration of that group. Percentage (B) = the proportion that skilled immigrants of a given ethnic group represented each year of immigrants of that ethnic group destined to the non-farm labour force.

a See footnote c, Table 19.

b See footnote b, Table 25.

SOURCE: Compiled by the Economics and Research Branch of the Dept. of Labour from information supplied by the Dept. of Citizenship and Immigration.

Table 27

IMMIGRATION OF PROFESSIONAL WORKERS TO CANADA BY ETHNIC ORIGIN, 1951-55^a

Ethnic origin	Professional workers				
	1951	1952	1953	1954	1955
British.....	1,586	3,575	4,832	5,062	4,108
Percentage (A).....	5.1	8.4	10.3	11.3	13.6
Percentage (B).....	9.6	16.6	18.9	20.7	24.6
German and Austrian.....	619	715	657	512	427
Percentage (A).....	1.9	2.5	1.7	1.5	2.1
Percentage (B).....	3.8	6.7	3.9	3.1	4.5
Italian.....	79	78	95	74	78
Percentage (A).....	0.3	0.4	0.4	0.3	0.4
Percentage (B).....	0.8	0.9	1.0	0.6	0.9
Netherlander.....	212	249	496	503	315
Percentage (A).....	1.1	1.2	2.4	3.1	4.5
Percentage (B).....	7.5	6.0	9.7	9.8	13.6
U.S. ^b	446	923	1,033	1,081	1,122
Percentage (A).....	5.8	9.9	11.0	10.7	10.8
Percentage (B).....	15.0	25.6	27.2	27.3	28.1
Other.....	1,908	1,789	1,475	1,118	1,109
Percentage (A).....	2.4	4.3	5.1	4.5	5.0
Percentage (B).....	5.4	9.1	11.1	9.5	11.1
Total, professional workers.....	4,850	7,329	8,588	8,350	7,159
Percent of total immigration.....	2.5	4.5	5.1	5.4	6.5
Percent of all immigrants destined to non-farm labour force.....	5.7	10.8	11.6	11.4	14.0

NOTE: Percentage (A) = the proportion that immigrant professionals of a given ethnic group represented each year of total immigration of that group. Percentage (B) = the proportion that immigrant professionals of a given ethnic group represented each year of immigrants of that ethnic group destined to the non-farm labour force.

^a See footnote b, Table 19.

^b See footnote b, Table 25.

SOURCE: Compiled by the Economics and Research Branch of the Dept. of Labour from information supplied by the Dept. of Citizenship and Immigration.

Table 28

PROSPECTIVE IMMIGRATION OF PROFESSIONAL AND SKILLED WORKERS, 1956-65

	Professional workers	Skilled workers
Estimated total for 1956-57.....	22,000	48,000
Prospective immigration 1958-65:	Average annual rates	
Total.....	8,000	14,500
British ^a	4,940	4,500
German and Austrian.....	440	3,300
Italian.....	100	2,750
Netherlander.....	320	640
From U.S.....	1,000	350
Other.....	1,200	2,960
Prospective total, 1956-65.....	86,000	164,000

^a Includes English, Irish, Scottish, Welsh.

SOURCE: Economics and Research Branch, Dept. of Labour.

With regard to skilled workers, it is expected that about 10% of future immigrants will be in this category. This ratio was reached by setting the proportion of skilled workers at 15% in the prospective German element, and lower for the other major groups. The ratio for British immigrants was projected at 10%, and for immigrants of Dutch and Italian origin at 8% and 11% respectively. These ratios, like those of professional workers, were chosen in relation to recent trends.

Assuming that during 1958-65 total immigration to Canada will average about 137,000 annually, it seems reasonable to expect that the inflow of professional workers will be equal to about 6% of this total, or about 8,000 a year on the average. Skilled workers are likely to account for a higher proportion, about 10% of the total, or approximately 14,500 a year from 1958 to 1965.

Prospective Emigration

The effect of immigration on the Canadian labour force will, of course, be partly offset by emigration. It is possible to consider here only emigration to the United States, as the necessary information on emigrants to other countries is lacking. However, by far the largest part of emigration from Canada is to the United States.

Native Canadians, who make up the bulk of emigrants from this country to the United States, are not subject to the quota limits set by the United States government, so that the volume of migration from Canada to the United States depends mainly on the relative pulling power of employment opportunities in the two countries. During the first half of the present century, emigration of workers to the United States fluctuated widely. It reached

Table 29

CANADIAN LABOUR FORCE AND EMIGRATION OF SPECIALIZED MANPOWER TO THE U.S. 1951-55, WITH PROJECTIONS FOR 1960 AND 1965

Workers emigrating to the U.S.

Year	Civilian labour force, Canada (annual averages) (thousands)	All workers		Professional workers		Skilled workers	
		Number	% of labour force	Number	% of all workers emigrating	Number	% of all workers emigrating
1951.....	5,217	12,970	0.25	2,937	22.6	1,784	13.8
1952.....	5,315	17,382	0.33	3,811	21.9	2,572	14.8
1953.....	5,383	17,872	0.33	3,538	19.8	2,963	16.6
1954.....	5,426	17,141	0.32	3,366	19.6	2,733	15.9
1955.....	5,558	19,141	0.34	4,176	21.8	3,494	18.3
1960.....	6,210 ^a	20,500	0.33	4,325	21.1	3,752	18.3
1965.....	6,990 ^a	23,100	0.33	4,874	21.1	4,227	18.3

^a Projection made by the Commission assuming net immigration of 75,000 per annum.

SOURCE: Economics and Research Branch, Dept. of Labour. Emigration figures for 1951-55 are based on information supplied by the U.S. Dept. of Justice.

an annual average rate of 46,000 during the '20's, and then dropped to about 5,000 annually during the depression years of the '30's. Since World War II emigration to the United States has risen steadily as the Canadian labour force has grown and opportunities in the United States have been expanding. The proportion of the labour force emigrating each year has also increased slightly over the postwar decade. In the early postwar years the proportion of Canadian workers emigrating to the United States was perhaps below what might be regarded as a long-run average, because of circumstances mentioned in Chapter 3.

Since 1952 the proportion of workers emigrating each year to the United States has remained fairly constant, ranging from 0.32% to 0.34% of the labour force. The average of these percentages, at 0.33% for 1952-55, is used to project the prospective total emigration of workers to the United States for the 1956-65 decade. On this basis, the number of workers who can be expected to emigrate to the United States in 1960 and 1965 is shown in Table 29, together with estimates for professional and skilled workers in the projected total.

During 1951-55 the proportion of professionals among the workers emigrating each year to the United States remained within 1.5 points of the five-year average. This average, at 21.1% has been used for the projection. The proportion of skilled workers, on the other hand, showed a steady rise, interrupted only once during the five-year period. In the light of this trend, the projection for skilled workers was made at a rate equal to the most recent actual figure.

On the basis of these projections, by 1965 annual emigration of professional workers to the United States should be near the 5,000 mark, and that of skilled workers around 4,200. Total emigration of workers in 1965 is expected to exceed 23,000.

Prospective Net Immigration

In Table 30 the projected losses to the Canadian labour force from emigration to the United States are weighed against the prospective gains from immigration. It must be stressed once more that these figures do not represent targets, but only the result of the stated assumptions. The resulting balances, moreover, are only an approximate measure of the prospective net gain, since they do not take into account migration from Canada to countries other than the United States.

Because migration is a function of so many variables, it is impossible to predict precisely what the flow may be either over a period of years or from year to year. Although the projections in Table 30 allow for fluctuations, their main object is to assess the outlook, uncertain as it is, for the 1956-65

Table 30

APPROXIMATE NET IMMIGRATION OF SPECIALIZED MANPOWER 1946-55, WITH PROJECTIONS FOR 1956-65

Period	Professional workers			Skilled workers		
	Immigration	Emigration to the U.S.	Approximate net immigration	Immigration	Emigration to the U.S.	Approximate net immigration
1946-50.....	2,146	2,655	-509	<i>Annual averages</i>	1,361	5,643
1951-55.....	7,255	3,565	3,690		2,709	16,026
Projection:						
1956-57.....	11,000	4,200 ^a	6,800		3,620 ^b	20,380
1958-65.....	8,000	4,450 ^a	3,550		3,845 ^b	10,655
				<i>Totals</i>		
1946-50.....	10,732	13,276	-2,544	35,019	6,803	28,216
1951-55.....	36,276	17,828	18,448	93,677	13,546	80,131
Total 1946-55.....	47,008	31,104	15,904	128,696	20,349	108,347
Projection:						
1956-57.....	22,000	8,400	13,600	48,000	7,240	40,760
1958-65.....	64,000	35,600	28,400	116,000	30,760	85,240
Total 1956-65.....	86,000	44,000	42,000	164,000	38,000	126,000

NOTE: Projections are derived from Tables 28 and 29.

a Based on projected emigration of 21,000 from 1956 to 1960 and of 23,000 from 1961 to 1965.

b Based on projected emigration of 18,100 from 1956 to 1960 and of 19,900 from 1961 to 1965.

SOURCE: Economics and Research Branch, Dept. of Labour.

See also Tables 20 and 21.

decade as a whole. The projection of immigration was arrived at by combining the estimate for 1956-57 with the prospective total for the balance of the 10-year period. The prospective emigration totals are based on the actual figure for 1955, the estimates for 1960 and 1965, and interpolations for the intervening years.

These calculations suggest that if both immigration and emigration continue at the projected levels, the net contribution of migration to Canada's resources of specialized manpower in 1956-65 should be higher than in the postwar decade. Immigration, however, was much higher in the second half of this decade than in the first. Compared with the high immigration years of 1951-55, and leaving aside the still higher net inflow during 1956-57, the outlook for 1958-65 is somewhat different for skilled workers than for professional workers. As shown in Table 30 the projection of the approximate net immigration of skilled workers for 1958-65, at an average of about 10,700 a year, is a good deal lower than the actual average for 1951-55. On the other hand, the projection for professional workers for 1958-65 is not appreciably below the 1951-55 rate, even though a decline in total net immigration is projected. It was assumed, however, that the proportion of professional workers among immigrants would remain at the higher levels of recent years and that the ethnic groups which contribute large numbers of professionals would play a relatively more important role in future immigration.

Prospective Supply of Professionals

A rough approximation of total new supplies of professionals during 1956-65 can be obtained by combining the foregoing projections of graduations with those of net immigration of professionals. In comparing the prospective contribution from these two sources, it must be kept in mind that the net immigration estimates include a large group of nurses and teachers as well as other professionals who are not necessarily university graduates and are therefore not covered by the projection of graduations. This factor, however, will not unduly distort the relative position of these two sources in 1956-65, compared to the previous decade, since the net immigration figures are subject to the foregoing qualification for both periods.

On the basis of the two above-mentioned sources, the projected new supply of professionals for 1956-60 at 92,300 will be only slightly higher than the actual total of 85,000 for the preceding five-year period. As shown in Table 31, this increase is expected to stem almost entirely from immigration. The total number of graduations during this five-year period will not be appreciably higher than the 66,600 in the preceding five years because the projected growth in graduations between 1956 and 1960 will still not exceed the high level of the early '50's when veteran graduations swelled the

totals. After 1960, however, the increase in college-age population combined with the anticipated increase in the proportion of this group attending university will have a dramatic effect. From 1960 to 1965, despite a projected drop in immigration, total new supplies may be expected to total 110,100, an increase of nearly 18,000 over the preceding five years.

Table 31

GRADUATIONS AND APPROXIMATE NET IMMIGRATION OF PROFESSIONALS 1946-55, WITH PROJECTIONS FOR 1956-65

Period	Graduations	Approximate net immigration of professionals	Total
1946-50.....	67,649	—2,544	65,105
1951-55.....	66,617	18,448	85,065
Projection:			
1956-60.....	67,300	25,000	92,300
1961-65.....	93,100	17,000	110,100

SOURCE: Economics and Research Branch, Dept. of Labour.

See also Tables 9, 24, 28 and 30.

New Supplies of Engineers

During the next decade, requirements will probably be more intense for engineers than for most other professional groups. It is likely, however, that the supply of engineers will also increase in 1956-65.

As shown in Table 32, during 1951-55 the new supply of engineers amounted to approximately 13,000. Of these, about 8,000 came from Canadian universities and the remainder from net immigration. If it is assumed that by 1965 engineering enrolments will have increased from the present 17% to 19% of total undergraduate enrolment, graduations alone may be expected to provide 10,200 engineers during 1956-60 and 15,300 during 1961-65.

Table 32

GRADUATIONS OF ENGINEERS AND APPROXIMATE NET IMMIGRATION OF ENGINEERS 1951-55, WITH PROJECTIONS FOR 1956-65

Period	Graduations of engineers	Approximate net immigration of engineers	Total
1951-55.....	8,123	4,715	12,838
Projection:			
1956-60.....	10,200	4,700	14,900
1961-65.....	15,300	3,400	18,700

SOURCE: Economics and Research Branch, Dept. of Labour.

See also Tables 9 and 33.

Table 33
APPROXIMATE NET IMMIGRATION OF ENGINEERS 1951-55, WITH PROJECTIONS FOR 1956-65

Year	Immigration			Emigration to the U.S.			Approximate net immigration of engineers
	All professional workers	Engineers	% ^a	All professional workers	Engineers	% ^a	
1951.....	4,850	970 ^b	20.0 ^b	2,937	447	15.2	523
1952.....	7,329	1,466 ^b	20.0 ^b	3,811	538	14.1	928
1953.....	8,588	1,900 ^c	22.1	3,538	529	15.0	1,371
1954.....	8,350	1,687	20.2	3,366	494	14.7	1,193
1955.....	7,159	1,315	18.4	4,176	615	14.7	700
Total 1951-55.....	36,276	7,338	20.2	17,828	2,623	14.7	4,715
Projection:							
Total 1956-60.....	46,000	7,820	17.0	21,000	3,150	15.0	4,670
Total 1961-65.....	40,000	6,800	17.0	23,000	3,450	15.0	3,350

NOTE: Projections for total professional workers are derived from Tables 28 and 29.

a Per cent of engineers among all professional workers.

b Estimate.

c Estimated total for the year on the basis of returns for the last nine months.

SOURCE: Economics and Research Branch, Dept of Labour. Figures for 1951-55 are based on information supplied by the Dept. of Citizenship and Immigration and the U.S. Dept. of Justice.

Net immigration, on the other hand, will probably play a diminishing role as a source of engineers. As shown in Table 33, between 1953 and 1955 engineers represented a declining proportion of the professional workers among immigrants, while among emigrants the ratio of engineers to all professional workers held steady. In fact, preliminary returns for 1956 suggest that the number of engineers who emigrated in that year was greater in relation to other professional workers than in previous years. But even when projected at the 1951-55 ratio, emigration of engineers during 1956-65 will show an increase because of the uptrend in total emigration which is anticipated for the years ahead. Thus if both immigration and emigration continue at the projected levels, the contribution of net immigration to the supply of engineers will drop from about 4,700 in 1956-60 to 3,400 in 1960-65. This drop, however, will be more than offset by the prospective increase in graduations. The total supply of engineers may, therefore, be expected to rise from 12,800 in 1951-55 to 14,900 in 1956-60 and to 18,700 in 1961-65.

Prospective Requirements for Professional Workers

The problem of estimating the number of professional workers that will be required in Canada at a future date is complicated by the fact that professionals are an extremely heterogeneous group. They include dentists and archaeologists, nurses and violinists, bishops and mechanical engineers. The demands for the services of different professions are likely to grow at different rates, in response to different sets of factors.

For some professions, one might expect that an adequate forecast of future requirements could be made by projecting past trends, on the basis of a projection of Canada's total population. The number of dentists, of nurses or of school teachers required, for example, might be expected to be related in a fairly simple way to the size of the total population and its age distribution. However, the Censuses of 1931 and 1951 show that although Canada's total population increased by about 35% between these two dates, the number of dentists increased by only 14%, while that of graduate nurses increased by 72%. At the same time, the number of school teachers increased by 27%, while the population of school age increased by about 13%.

In projecting requirements for professional workers, therefore, it is necessary to allow not only for the growth of the population and the labour force, but also for factors that might cause a given profession to grow more or less rapidly than the total population or the total labour force, and to consider whether these factors will be more or less important in the future than in the past.

The role of these latter factors is more difficult to estimate for some professions than for others. The demand for physicists or for engineers, for example, is affected by changes in the economy that are less continuous and

less predictable than the growth of population. Scientific and technological advances, sometimes speeded by the needs of defence, are bringing about changes in industry which may, now and during the next generation, be more widespread than at any previous period. These changes seem likely to increase the demand for scientists, engineers and some other types of professional worker more rapidly than in the past, and also more rapidly than the demand for less qualified types of workers.

It is becoming increasingly clear that as an economy such as Canada's becomes more highly developed, the speed at which new products and services are introduced, or old ones are changed, increases. These developments, in turn, promote additional requirements for professional workers that exceed any rise in population or the labour force.

Consequently, estimates of future requirements for professional workers based on projections of past trends and of the total population or labour force form only a starting point for an analysis of probable demand.

Trends in the Recent Past

If the trends of the past generation are examined it is evident that both in Canada and in the United States the number of professional workers has been increasing more rapidly than the total labour force.

In the United States, between 1930 and 1954, the number of scientists and engineers is estimated to have increased from 260,000 to 850,000. This was an average rate of increase of some 5% per year, compounded annually. In Canada, between 1931 and 1951, the number of engineers approximately doubled, an average rate of increase of some 3½% per year, compounded annually. In both countries, these rates of increase were much greater than that of the total population or the total labour force.

It must be borne in mind that the decade of the '30's was a period of relative economic stagnation, especially in Canada. The rate of increase in the number of Canadian professional workers was therefore greater between 1941 and 1951 than in the preceding 10 years. Since this rate of increase has varied in recent decades, it follows that estimates of future requirements for professional workers reached by the projection of past trends will differ considerably depending on whether the projection is made on the basis of trends prevailing between 1931 and 1951, or some earlier period, or those of 1941 to 1951 or some more recent period.

For the purpose of a first approximation of requirements (shown in Table 34), it has been assumed that the Censuses of 1931 and 1951 provide a useful basis for projection. In using this basis, however, the condition of the economy at both dates must be kept in mind.

The year 1931 was the second of the depression. Nevertheless, the prosperous years of the '20's provided suitable conditions for building up reserves of professional workers, who normally require a prolonged period of training. How the slump in industrial activity between 1929 and 1931 affected the proportion of professional workers in the labour force is not known, but it is possible that proportionately fewer professional than other workers were forced out of the labour force in these years. It may be, therefore, that the proportion of the labour force accounted for by professional workers in 1931—4.8%—was slightly greater than it would have been had 1929 conditions prevailed in 1931. It can be held, however, that 1931 is a better anchor date for 1951 than is 1941, for while economic conditions in the decade preceding 1951 demanded a substantial increase in professional workers, conditions in the decade before that prevented such a build-up.

The year 1951, on the other hand, was one in which the unsatisfied backlog of demand for professional workers was still strongly in evidence. Shortages of professional workers of many types were apparent in 1951 and have persisted down to the present. The number of professional workers recorded in the 1951 Census, therefore, cannot be taken as a measure of the total requirement for professional workers in 1951. For all requirements to be satisfied in 1951, the number of professional workers in Canada would have had to increase still more rapidly than it actually did during the preceding 10 years.

It might be argued that conditions during the war years did not favour the buildup of a reserve of professional workers that would be required during the rapid economic expansion that followed. The hiatus in supplies between 1945-51 was partly filled, however, by the training of veterans. It might also be argued that the rate of peacetime expansion of university training up to 1951 was greater than could be expected for subsequent years. Nevertheless, allowing for these factors, it is felt that the proportion of professional workers, which amounted to 5.8% of the civilian labour force in 1951, slightly understated the total requirements at that date. In addition, remembering that for some time yet professional workers will continue to be required at a faster rate than the growth in the labour force, it is probable that the 1931-51 trend, when projected, will slightly understate actual requirements.

The requirements for professional workers shown in Table 34 may therefore be regarded as minimum.

Table 34

PROJECTED PROFESSIONAL REQUIREMENTS ON THE BASIS OF 1931-51 TRENDS

	Periods	
	1956-60	1961-65
Net requirements ^a	60,000	71,000

^a Increase in total numbers from beginning to end of each period.

SOURCE: Economics and Research Branch, Dept. of Labour.

In 1931, the number of workers in occupations regarded as professional in this Report comprised 4.8% of the civilian labour force. By 1951, this proportion had risen to 5.8% or approximately 300,000 workers.

If the 1931 to 1951 trend were to continue, professional workers would comprise 6.4% of the labour force by 1960 and 6.7% by 1965. Estimates of total professional staff required at the two future dates can be calculated by applying the above percentages to the estimated labour force for 1960 and 1965 as projected by the Commission staff.⁵ On the 1931-51 basis, total requirements for professional workers would approximate 398,000 in 1960 and 469,000 in 1965. The figure for 1955 was about 338,000. Net requirements would therefore amount to 60,000 for the five-year period 1956-60, and 71,000 for the 1961-65 period.

It must be reiterated that these estimates are projections of a past trend and will therefore either understate or overstate the future trend. Present indications are that the estimates may be somewhat low. It must also be emphasized that the estimates are aggregates and do not throw any light on changing trends in individual occupations.

Prospective Requirements for Skilled Workers

Many of the problems of projecting future requirements for professional workers are the same as those in projecting requirements for skilled workers. There are some major differences however. In some respects the supply and demand factors affecting the two groups are basically different and respond somewhat differently to the same economic conditions. While requirements for both groups are affected by such major developments as the rising standard of living and increasing substitution of capital for labour through technological change, professional workers tend to be affected more by the former factor and skilled workers more by the latter. Secondly, requirements for skilled workers are more sensitive to short-run fluctuations in economic activity. The proportions which these two groups comprise of the labour force at any given date, of course, do not disclose whether or not requirements at that time were effectively met.

The characteristics of the supplies of the two groups should be considered in the selection of a census date for purposes of projection. By and large, because training takes longer, is more formal and undoubtedly costs more for professional than for skilled workers, supplies of professional workers are more inelastic over shorter periods of time. On the basis of this assumption, 1941 was considered a better anchor date than 1931 for projecting future requirements of skilled workers beyond 1951.

⁵Royal Commission on Canada's Economic Prospects, *Preliminary Report*, December 1956, Table VII, p. 21.

Skilled workers comprised 12.3% of the civilian labour force in 1941 and 15.0% in 1951. While the first half of the decade preceding 1941 was stagnant, the second half and especially the two war years undoubtedly accounted for the much higher than normal requirements for skilled workers. Supplies of skilled workers, however, can be fairly elastic since the training periods for such workers can be speeded up under the pressure of increasing demand. The increase of skilled workers to 12.3% of the labour force by 1941, therefore, is probably in line with 15.0% in 1951 and provides a reasonable basis for projecting further increases in the numbers of skilled workers during the next decade. The 1941 figure may, of course, be slightly low and consequently the projection to 1960 and 1965 may be slightly high. The 1951 figure of 15.0% is considered to represent the situation at that time fairly adequately.

If the 1941-51 trend should continue, the skilled worker component of the civilian labour force would amount to 16.3% in 1955 and 19.6% in 1965. Applying these percentages to the actual labour force in 1955 and the estimated labour force of 1965, the total number employed would be 905,000, and 1,370,000 respectively. This means that net requirements would have to increase by some 465,000 between 1955 and 1965, an estimate that appears to be a good deal too high.

If the 1951 ratio of 15.0% is assumed to hold constant until 1965, total requirements at 1955 and 1965 will be 833,000, and 1,050,000 respectively, or a net requirement of 217,000 over the decade. This, on the other hand, may be somewhat low.

The rapid expansion of construction, manufacturing and mining in the postwar period entailed a rapid buildup in supplies of skilled labour. It seems probable, therefore, that the 1941-51 trend continued until 1955, bringing the skilled worker component of the labour force to 16.3%. It does not seem reasonable, however, to project this high proportion beyond 1955, taking into account recent and prospective developments in the industrial sectors affecting skilled worker requirements most. On the other hand, there is little evidence to suggest that this proportion will not remain more or less stable after 1955. The assumption here, however, is that the skilled worker component will continue to expand as a proportion of the total labour force beyond 1955, but only at about one-quarter the 1941-51 rate. This would bring the ratio to 17.2% by 1965. If this happens, the total number of skilled workers in 1965 will be almost 300,000 higher than in 1955.

The main reason for assuming that requirements will increase more slowly in the second than in the first postwar decade is that the weight of such sectors of the economy as manufacturing, mining and construction, where skilled workers are concentrated, is unlikely to increase proportion-

ately as much in the second as in the first postwar decade.⁶ Another reason for assuming a slower rate of expansion in requirements is that with the extension of automatic processes, the proportion of skilled workers to total workers will tend to level off. There is evidence now, however, that some of these advanced processes require a higher level of skills than formerly, as seen by the emergence of the technician. While these workers will undoubtedly continue to increase at a rapid pace, they will remain a relatively small proportion of the total group of specialized workers. As automated processes absorb some of the functions of skilled tradesmen, and as the technician group grows, the skilled tradesman group is likely to shrink as a portion of total manpower.

In the light of the above discussion, the assumption that skilled workers will form 17.2% of the labour force by 1965 seems to be reasonable.

Factors Affecting Future Requirements for Professional and Skilled Workers

The growth in demand for the services of professional and skilled workers is affected by different factors in different ways. Two of the factors with the most widespread influence have already been mentioned in this Report: the rise in the Canadian standard of living, and industrial development as affected by scientific and technological advances. A fuller discussion of how these factors may affect requirements for specialized workers in future follows.

Effects of a Rising Standard of Living

As real income per capita increases, a smaller percentage of income is likely to be spent on such basic necessities as food, clothing, and housing, and a larger percentage is available for other uses.

One obvious result of this is an increase in the percentage of income spent on such commodities, formerly considered luxuries, as automobiles, television sets, etc. Such commodities as power saws, which are necessities in some occupations, may also now be purchased as luxuries by people in other occupations. Indirectly, all this spending affects the demand for specialized workers⁷ in relation to the demand for other workers.

More direct effects, particularly on requirements for professional workers, are likely to appear, however, as a result of the allocation of a larger percentage of income to satisfying demands for special services in such fields as education, health, culture and recreation.

⁶For example, the capacity of the construction industry doubled in the first decade. It is very unlikely to do so in the second. (See also Royal Commission on Canada's Economic Prospects, *Preliminary Report*, pp. 66-67. Manufacturing employment is expected to remain a constant proportion of total employment during the next 25 years.)

⁷Professional, as generally defined in this Report, and skilled workers including technicians.

In education, there has been an evident trend in recent generations toward more years of education for the average Canadian. On the basis of this trend, and of the anticipated increase in the population of school and college age, it has been estimated that, during the decade between 1955 and 1965, enrolment in public elementary schools will increase by more than 40%, in public secondary schools by more than 80%, and in universities and colleges by more than 100%. It has been estimated that the number of school teachers required (elementary and secondary) may increase during this decade by about 50,000, or nearly one-half, and the number of university and college teachers by about 60%, or nearly 4,000.

Health is another field in which the demand of the public for professional services seems likely to increase in relation to total expenditure as the national real income per capita increases. As indicated previously, the number of graduate nurses in Canada increased between 1931 and 1951 by a much larger percentage than total population. The number of physicians and surgeons, however, increased only a little more rapidly than the population, and the number of dentists much more slowly than population. There is currently a shortage of all of these types of medical personnel, and the projection of the past trends of growth in these professions would give an inadequate estimate of future requirements.

Cultural and recreational activities are also likely to absorb a greater percentage of income, as income increases. In accordance with this expectation, there were relatively large increases between 1931 and 1951 in the numbers of artists and art teachers, authors, journalists and librarians. For professions in these fields it seems reasonable to expect a rate of growth in the future at least as rapid as in the past.

In 1951, the professions concerned with education, health and culture together accounted for more than half of Canada's total professional workers. The upward trend of real income per capita in Canada seems likely to cause requirements for professional workers of these types to grow more rapidly than the total Canadian population or the total labour force, and more rapidly than these requirements have grown in the past.

Effects of Scientific and Technological Advances

The application of new scientific and technological discoveries is bringing about changes in industry, perhaps on a wider front than ever before. Obvious examples are the current developments in nuclear power, aviation and electronics. The needs of defence and the importance of keeping technically ahead of potential enemies have played an important part in launching the current wave of technological advances. Automation has been accelerated largely by rapid growth of demand, limited supplies of labour and new applications of science to industry.

Technological advances, large expenditures on defence, a high rate of private investment and a high level of employment have mutually stimulated one another during most of the years since the end of World War II, and have produced a rate of expansion rarely equalled in the past either in duration or intensity.

Intensified development of Canada's natural resources, especially raw materials and power, has been stimulated by the increasing demands of domestic and foreign markets, and has been facilitated by the growing application of science to prospecting.

The rapid expansion of production, and the increasing application of science to production and management, might reasonably be expected to increase the demand for scientists, engineers and certain categories of skilled and technically trained workers. Shortages of these workers in recent years indicate that this expectation is justified.

As production processes have become more complex and as the number of ancillary services clustered around these processes has increased, Canada's dependence on an expanding group of specialists has similarly increased. The introduction of new products and new methods depends on the application of scientific discoveries, which in turn increases the requirements for scientists, engineers, technicians and skilled tradesmen. The growing dependence on specialized manpower can be seen from the fact that between 1931 and 1951 the professional worker component increased by 21%—from 4.8% to 5.8% of the labour force—and the skilled worker component increased by 36%—from 11% to 15% of the labour force.

Current indications suggest that during the next decade the rise in the standard of living and technological advances will continue to be important factors and may even have greater effect than in the past. Precisely how they will continue to affect requirements for specialized manpower is not known because of the many unpredictable variables in the developing situation. Obviously the occupational composition of the professional and skilled worker groups will continue to change with future increases in total requirements. Some will accelerate greatly; others will level off; some may even decline. Estimates of total requirements based on past trends can therefore only be a first approximation of future trends.

Nevertheless, the impact of the two factors discussed may be such that total requirements for professional workers will be slightly higher than the estimates derived from projecting historic trends. A rising standard of living will tend to broaden the demand for many kinds of professional workers, and advances in technology will tend to speed up the need for such specialists as scientists and engineers. While professional workers can obviously not continue to increase indefinitely, it is not likely that any levelling off will occur until after 1965.

Skilled workers will continue to be in strong demand. However, a much more drastic change is probably taking place in the composition of this group than in the professional group and this trend is likely to continue in the future. As automatic processes increase, the demand for many skilled workers will probably contract.

It is difficult to evaluate the adequacy of the estimate of requirements for skilled workers for the next 10 years. Apart from the fact that over time changes occur in the classification of skilled trades, a rising standard of living is likely to produce new products and new industries and hence a growing demand for skilled workers. On the other hand, the trend toward automatic processes is likely to slow up the growth in requirements for traditional types of skilled tradesmen while at the same time increasing requirements for the newer kinds of technicians.

As a percentage of the labour force, the skilled worker component expanded more rapidly than the professional group from 1931 to 1951 (21% for professional workers and 36% for skilled workers), but it is unlikely that this will continue for any length of time. The skilled worker component has been projected to 17.2% of the labour force in 1965, compared with an actual 11% in 1931, and 15% in 1951 (12.3% in 1941). An evaluation of the different cross-currents in the economy affecting requirements for skilled workers such as the trend toward automation, new products and new industries, and the very rapid employment increases in the service industries, which use little skilled manpower, lead to the conclusion that the projected increase of almost 300,000 in requirements for skilled workers between 1956 and 1965, while conservative, may not be unreasonable.

Table 35 attempts to reconcile projected requirements for professional workers with estimated supplies during the two periods. Taken at face value, the figures suggest that available supplies will fall somewhat short of requirements in 1960 but will come closer to demand by 1965. However, as stated at the outset of this section, these figures are useful approximations but need qualification. As mentioned earlier the projected requirements for 1960 and 1965 might be on the low side; first, because the historic trend is likely to accelerate slightly and secondly, because the projected levels of the labour force for 1960 and 1965 may be somewhat low owing largely to unexpectedly large increases in immigration in 1956 and 1957.

The supply estimates may also be somewhat low. Increases could come from a number of sources. First, while the projected participation rate of the college-age group in university training by 1960 seems to be reasonably high, the persistent strong demand and consequent rising incentive to undertake university training might well boost this rate slightly. Secondly, not all graduates become professional workers, and not all professional workers, notably school teachers and registered nurses, undertake university training. It is

possible, furthermore, that this group of non-graduates is larger than it is commonly understood to be. For example, preliminary results of a survey on the sources and training of engineers currently being conducted by the Economics and Research Branch of the Department of Labour show that a fairly sizable number of engineers reach professional status by routes other than the direct, formal one beginning with university graduation. Most of the professionally trained workers, of course, are graduates. But under persistent pressure of demand the proportion of graduates who do not become professional workers may shrink somewhat, while that of workers reaching the professional status without graduating may increase somewhat. As noted elsewhere in this Report, however, the training of professional workers cannot be accelerated nearly as much as that of skilled workers under similar demand pressures.

Table 35

PROJECTED REQUIREMENTS AND SUPPLIES OF PROFESSIONAL WORKERS, 1956-65

	Period	
	1956-60	1961-65
Net requirements ^a	60,000	71,000
Replacements ^b	37,200	42,800
Gross requirements	97,200	113,800
Estimated supply ^c	92,300	110,100

a Increase in total numbers from beginning to end of each period.

b Includes replacements for deaths, retirements and loss to non-professional occupations. Deaths were estimated from the Canada Life Table for 1951 and from the age distribution of professional workers as shown in the 1951 Census. A rough estimate of the numbers of retirements was made by assuming that all males retire at 70 and all females at 65 years of age. A rough estimate of immigrant workers entering Canada after 1951 who would be likely to die in the years 1956-60 and 1961-65 was added.

No account was taken of deaths and retirements of native Canadians entering professional occupations after 1951, as these numbers seemed likely to be negligible in comparison with other sources of error in the estimate. No allowance was made for retirements due to ill health or other causes before the ages arbitrarily selected.

While these two omissions may tend to make the estimates too small, an error in the opposite direction resulted from applying the 1951 Life Table (based on mortality for the total population, by sex) to professional groups for whom mortality rates may be expected to be lower than for the total population. Another error in the upward direction resulted from applying 1951 mortality rates to the years 1956-65 without allowance for the downward trend of mortality rates. For purposes of the present calculation, which is at best only a first approximation, these sources of error, in both directions, do not appear sufficiently great to justify the effort necessary to reduce them. The allowance for loss to non-professional occupations was based on rather uncertain evidence. It has been assumed that roughly one-sixth transfer to some other occupation not defined by the Census as professional.

c See Table 31.

SOURCE: Economics and Research Branch, Dept. of Labour.

Another and probably more promising source from which the estimated supplies may be augmented is immigration. Net immigration of professional workers in 1956 and 1957 was unusually high, totalling an annual average of 6,800 for the two years. The estimate for the next eight years is some 3,550 a year.

Under the continuing pressure of demand, which the anticipated rising levels of requirements are expected to produce, the projected figure of net immigration may be conservative. The experience of the postwar period has

shown that in periods of strong demand, supplies of professional workers can be increased to a limited extent through direct overseas recruitment and/or by increasing the total intake of immigrants. Given no major change in the overseas supply sources in the future, immigration should again help to meet requirements.

Taking the various factors that might affect over-all requirements and supplies into account, it appears likely that until 1960 supplies of professional workers may not entirely meet requirements, and that shortages of varying degrees may occur in a number of professional occupations. After that date, however, growing requirements and new supplies may come more closely into balance.

Concluding Observations

The present study, largely quantitative in character, has sought to develop a factual background which will assist in the consideration of measures for improving the quantity and quality of Canada's resources of skilled, technical and professional manpower. The study deals with the variables affecting the supply of, and requirements for, specialized manpower during the past 10 years and in the coming decade. The experience of the past 10 years has been used as a measuring rod against which the factors affecting the future supply of, and demand for, specialized manpower are assessed.

The study has not probed deeply into the qualitative problems associated with the training and education of skilled and professional workers so that requirements of the future can be met as effectively as possible. These are aspects of the subject with which the authors are not particularly well equipped to deal. No attempt is made, therefore, to produce specific policy recommendations concerning the training and efficient utilization of specialized manpower. It is intended rather to provide a factual background against which problems may be evaluated and policy recommendations formulated by educational authorities, private employers and other agencies concerned with the training, education and utilization of skilled and professional manpower.

The analysis has been limited by the scarcity of comprehensive factual information on the sources and utilization of specialized manpower in Canada. An effort was made, however, to mobilize such data as exist and to present them in a systematic way. Research undertaken for this study has involved considerable work on the part of the Economics and Research Branch of the Department of Labour in refining the available quantitative data and in obtaining additional data where this was possible. The research has revealed the importance of closing as many as possible of the gaps that still exist if a comprehensive and sufficiently detailed picture of Canada's

resources of skilled, technical and professional manpower is to be secured. There is much work to be done in building up comprehensive and current information on a uniform basis across the country on vocational and technical training activities at the secondary and post-secondary school levels. Little material exists on the utilization and recruitment of specialized manpower and on the ways in which skills are acquired outside formal training channels. Information on the occupational composition and qualifications of immigrants to Canada and their subsequent employment contribution to the economy is insufficient. Much research should be undertaken on the effects of a rapidly changing technology on the occupational composition of industry and on training and educational requirements. Many other inadequacies in existing information might be mentioned.

It is surprising that so little systematic information exists on Canada's most precious resource—the skills, capacities and creativeness of her people. It is on the skills of the working population, particularly the more highly trained elements in it, that the material and cultural progress of the nation depends. In an era of competitive national existence on both the economic and defence fronts, it is essential that Canada train and utilize her resources of specialized manpower as effectively as possible.

Manpower problems do not exist in isolation yet the tendency is to consider them unique and to rely on simple and shortsighted solutions. This tendency could, however, be counteracted if such problems as, for example, the shortage of mathematics and science teachers in secondary schools, the increased need for technicians and the improvement of the economic position of university professors, were considered in relation to one another in terms of prospective supplies of and demands for specialized manpower.

The training and effective utilization of specialized manpower should not be left to chance. Historically, however, the tendency has been to devote concentrated attention to these problems only when the country was in the throes of a wartime crisis or in peacetime when skilled and professional manpower shortages were intense. Once a crisis has developed, it is often impossible to deal effectively with the problem on a sound basis because specialized manpower cannot be trained in a short time. Once shortages have occurred, the damage to the economy is done and the results are loss of efficiency, lack of persons who can create and apply new technology, the lowering of the quality of instruction, the limitation of expansion and in many cases, a reduced quality of output.

It may be contended that shortages of skilled and professional manpower are not particularly serious. This may be true of manpower in general, for shortages of general labour may stimulate desired shifts to more capital intensive forms of production. On the other hand, professional manpower, and to an important degree, skilled and technical manpower, by the very nature

of their contribution to production, cannot be replaced by machines. In fact, they play a facilitating role in the introduction of technology and their relative scarcity limits the pace of its adoption. Evidence from current studies shows that the undesirable effects of professional manpower shortages are spread through industry, universities and government agencies in a variety of ways. To a lesser degree, the same undesirable results—lowered productivity and inferior technical work—stem from shortages of skilled workers and technicians. The rapidity with which major technical improvements can be introduced depends not only on the availability of engineers, scientists and technicians, but also on the availability of skilled tradesmen.

This study has examined the implications for specialized manpower of the rapid rate of economic expansion in Canada during the postwar decade. It is anticipated by the Commission that a comparable pace of expansion, with brief short-run interruptions, may be expected during the next decade. This expansion has so far required a rapidly increasing supply of specialized manpower and some expansion of suitable training and educational facilities of various kinds.

The expansion of the postwar period created a severe pressure on specialized manpower supplies. While the rapidly expanding requirements were met to a considerable extent, except in such periods of acute shortages as the years 1947-48, 1950-53 and 1955-56, the means of doing so were often makeshift. These included the overcrowding of training facilities, unusually large use of upgrading and on-the-job experience as a means of acquiring skills, the acceleration of training for skilled and technical workers, the use of underqualified instructors, and in some years very heavy reliance on immigration.

During this period, as in earlier years of rapid economic expansion, the long-run insufficiency of Canadian vocational training and higher educational facilities was obscured by the easily available supply of immigrants possessing excellent skilled and professional qualifications. This immigration, valuable and indeed essential as it has been to the rapid development of Canada, particularly in the '20's, the late '40's and the '50's, has tended to reduce the urgency of giving consideration to the longer-run adequacy of our educational and training institutions.

In the 1956-65 decade, particularly during its first few years, requirements are likely to outrun the supply of trained and qualified workers in many skilled and professional occupations. The competition in world markets for many Canadian products and considerations of national defence demand that Canada keep abreast of the latest advances in science and in the application of new technology to production methods. To meet such challenges, expanded and improved facilities are required for the basic edu-

cation of youth and for the training of engineers, scientists and other professionals, as well as of tradesmen and technicians.

There is little or no evidence that requirements for qualified workers in these fields will slacken appreciably in the next 10 years or so. If demand is to be met, training and educational facilities at all levels of the educational system from primary school to post-graduate courses will have to be expanded in an orderly fashion. This will involve the careful planning and creation of suitable curricula, the acquisition of competent staff, the careful analysis of requirements for skilled and professional personnel, and continuing studies of the best types of training and educational programmes in the light of requirements. It will also involve the expansion of guidance facilities for the youth of the country and the creation of more opportunities for youth to acquire skills and professional qualifications.

Constant changes in society and in the economy are characteristic of the age in which we live. New methods of producing goods, new products, new knowledge and skills and new occupations will appear in the future as they have in the past. This strongly suggests that, in order to be able to adapt easily to changing technical conditions and new industrial requirements, more and more of the skilled, technical and professional workers will require a broad training and background in addition to their particular knowledge and skills in specific fields.

A basic factor affecting the supplies of skilled and professional manpower during the 1956-65 decade will be the sharp increase in the number of Canadians reaching the age at which vocational and professional training can be undertaken. This factor will become particularly significant after 1960. The rapidly expanding pool of young persons should form by far the largest source of trained manpower provided adequate training facilities are available. In fact, this predictable increase in the number of young persons means that training of some sort will have to be provided even if requirements do not expand as much as this study anticipates.

The heavy reliance placed in the past on informal on-the-job training and upgrading as a means of acquiring competence in skilled trades and technical occupations presents a further problem. It should be noted that, on the average, immigrant manpower has a much higher degree of formal vocational and technical training than is characteristic of native Canadians. The emphasis on an informal method of acquiring skill and experience has both advantages and limitations. It creates a labour force more adaptable to changing occupational requirements than when a large portion of the workers are highly qualified specialists produced after long years of training. At the same time, it points up the desirability of a greater degree of formal institutional and educational training in the future, particularly if less reliance is to be placed on the importation of more highly trained manpower

from abroad. Fast-changing technological developments affecting skilled and technical occupations create a need for people with a more thorough grounding in basic mathematics and science, which in turn means somewhat longer periods of formal training.

The analysis of future requirements and supplies of skilled tradesmen and technicians indicates that requirements can be fairly easily met by continued reliance on the traditional sources of such manpower, particularly in view of the anticipated substantial increases in the number of young persons reaching working age. However, the increasing complexity and pace of technological development suggests the need for a considerable upgrading in the quality of the supply of skilled and technical manpower, which in turn will require an evaluation of the character and extent of training facilities at both the secondary and post-secondary school levels.

As regards the adequacy of the supply of professional manpower at least during 1956-60, the outlook is somewhat less optimistic than for skilled workers. In the first place, university and college training usually requires three or four years to complete; secondly, the numbers attending universities have only begun increasing recently. Thus, although supplies of professional workers will expand very considerably during 1956-65, they still may not be adequate to meet requirements until the end of the decade.

The net immigration of professional workers, especially of engineers and scientists, will probably decline as a portion of total supplies. This means that relatively more professional workers will have to be trained in Canada. One factor of significance here, particularly in such fields as engineering and science, is the relation between the employment of professionally qualified personnel and the variety of technicians who assist them. Developments of the past few years have shown that greater availability of qualified technicians would help to ease shortages of professionals because many of the latter are performing functions that could more satisfactorily be undertaken by qualified technicians. An increase in training facilities for technicians, therefore, would help to relieve shortages of professionals.

This Report has not analyzed the many problems surrounding the higher education of professional manpower in Canada. They are largely beyond the competence of the authors. It is obvious, however, that higher educational facilities will have to be greatly expanded, that teaching staffs will have to be increased, and that the quality of professional training will have to be improved in the light of an increasingly complex technology and of a more highly developed society.

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